

Well-being at work on farms in Finland

**Stress, safety in animal handling
and working conditions of
women on dairy farms**

Doctoral Dissertation

Marja Kallioniemi



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Well-being at work on farms in Finland

Stress, safety in animal handling and working conditions of women on dairy farms

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Abstract

The restructuring of agriculture in Finland has resulted in several types of change on farms during recent years. The field areas and sizes of herds per farm have been increasing, while the number of farms has been decreasing. Concurrently, the risks of agriculture have increased. Ongoing change has been described as a modernization process from traditional farming towards a more enterprise form of agriculture. Farms are mainly owned by private persons in Finland.

The farm entrepreneurs and their well-being at work are at the core of this thesis. Human capacity, including work ability, health and coping has been assessed as a crucial element for the success of the farm enterprise. Stress is commonly described as a situation in which the demands of work are greater than the worker is able to cope with. This type of conflicting and strenuous situation may induce different kinds of symptoms and diseases in people. Agriculture is among the most injury-prone working sectors.

The aims of this research were to determine the prevalence and symptoms of stress among full-time farm entrepreneurs,

identify possibilities to increase occupational safety during animal handling work and characterise the negative and positive elements of women's working conditions on dairy farms. These aims were addressed through two main samples. The first was a telephone survey of 1 182 full-time farmers focusing on stress and symptoms among the respondents. Secondly, a qualitative study was carried out involving ten female farmers working on dairy farms that focused on occupational safety during animal handling and the working conditions of women.

According to the results, full-time farmers experienced less stress than among the general working population in Finland. One in four (26%) full-time farmers had symptoms of weakness or fatigue and one in five (19%) farmers had symptoms of insomnia or difficulties in falling asleep. Both of these symptoms had increased statistically significantly when compared to an earlier follow-up survey in 1992. Problems with social relationships and lowered state of health were associated with stress and symptoms. Pesticide usage of over two weeks during the previous growing period had an association with symptoms. Based on the literature review,

the most common stressors among farm entrepreneurs were the farm economy, regulations, the weather, dangers in farm work and new legislation.

In the qualitative study occupational accidents were frequent: nearly all women had suffered one or more injuries during the previous two years. Unexpected animal behavior was considered as the most significant injury risk. The results revealed that a positive relationship between the stockperson and cattle as well as knowledge of animal behaviour and welfare enabled a safer working environment to gradually be built in the cattle barn. In practice, the stockperson should keep physical conditions animal friendly, perform positive and predictable routines, habituate young calves to people, avoid the separation of an individual animal, not dominate animals by force and be patient during work among farm animals. In addition, it is important to always be prepared for self-defence.

Female respondents were involved in wide range of different work tasks on dairy farms. As a positive element, nearly all respondents considered work with animals and close to nature to be rewarding. On

the other side, women's working days were long. Old traditions may create invisible barriers to organizing the work in a more functional way on enlarged farm units. Most women chose farm entrepreneur as their professional title, but their professional position was often undefined or misunderstood. The valuable contribution of female farm entrepreneurs to agriculture should be recognized and supported, because women's expertise within agriculture is important in finding solutions for future challenges such as sustainable, organic agriculture and animal welfare.

Due to the ongoing restructuring of the agricultural sector in Finland, the well-being at work among farm entrepreneurs requires support, efforts and attention. The working environment related to agriculture includes several risks such as stress, injury and an impairment of work ability.

Key words:

agriculture, well-being at work, stress, symptoms, safety, female, working conditions

Työhyvinvointi maataloilla

Stressi, työturvallisuus eläinten hoitotyössä ja naisten työolosuhteet maidontuotantotiloilla

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Tiivistelmä

Viime vuosina maatalouden rakennemuutos on vaikuttanut suomalaiseseen maatalouteen monin tavoin. Peltoala ja tuotantoeläinten määrä tilaa kohti ovat kasvaneet, kun taas tilojen lukumäärä on vähentynyt. Samanlaisesti maatalouden riskit ovat kasvaneet. Meneillään olevaa muutosta on kuvailtu prosessiksi, jossa siirrytään perinteisestä maataloudesta uudentyypiseen, yritysmaisempään maatalouteen. Suomessa maatilat ovat pääosin yksityishenkilöiden omistuksessa.

Väitöskirjan keskiössä ovat maatalousyrittäjät ja heidän työhyvinvointinsa. Inhimillinen toimintakyky, johon vaikuttavat terveydentila, työkyky ja hyvinvointi, on keskeinen, maatilayrityksen menestykseen vaikuttava tekijä. Stressiä kuvaillaan yleensä tilanteena, jossa työn tekijälleen asettamat vaatimukset ovat suuremmat kuin mistä ihminen kykenee selviytymään. Tällainen ristiriitainen ja kuormittava tilanne voi aikaansaada erilaisia oireita ja sairauksia. Maatalous on yksi tapaturma-altteimmista työaloista.

Tutkimuksen tavoitteina oli määrittää stressin esiintymistä ja oireita päätoimisilla maatalousyrittäjillä, etsiä keinoja parantaa

työturvallisuutta eläinhoitotyössä sekä selvittää naisten työolosuhteiden myönteisiä ja kielteisiä piirteitä maidontuotantotiloilla. Tavoitteisiin paneuduttiin kahden tutkimusaineiston avulla. Stressiä ja sen oireita tutkittiin puhelinhaastatteluaineiston avulla, johon vastasi 1 182 päätoimista viljelijää. Toiseen, laadulliseen tutkimukseen osallistui kymmenen maidontuotantotiloilla työskentelevää naista. Jälkimmäinen tutkimus paneutui työturvallisuuteen eläinten hoitotyössä ja naisten työolosuhteisiin.

Kyselytutkimuksen tulosten mukaan päätoimiset maatalousyrittäjät kokivat vähemmän stressiä kuin työikäinen väestö Suomessa keskimäärin. Noin joka neljäs (26 %) päätoiminen maatalousyrittäjä koki voimattomuutta ja väsymystä ja noin joka viides (19 %) koki unettomuutta tai vaikeuksia nukahtaa. Nämä molemmat oireet olivat lisääntyneet tilastollisesti merkitsevästi edelliseen, vuoden 1992 seurantaan verrattuna. Ongelmat sosiaalisissa suhteissa ja heikentynyt terveydentila olivat yhteydessä stressiin ja henkiseen hyvinvointiin liittyvien oireiden kokemiseen. Myös yli kahden viikon pituinen torjunta-aineiden käyttö edellisen kasvukauden aikana oli yhteydessä

oireiden kokemiseen. Kirjallisuuskatsauksen mukaan maatilayrittäjille aiheuttavat stressiä tilan taloudellinen tilanne, säännöt, sää, maatilalla työskentelyyn liittyvät vaarat ja uusi lainsäädäntö.

Laadullisessa tutkimuksessa havaittiin, että työtaturmat olivat yleisiä: miltei kaikki naiset olivat kokeneet yhden tai useamman tapaturman kuluneiden kahden vuoden aikana. Eläinten odottamaton käyttäytyminen arvioitiin merkittävimmäksi tapaturmariskiä lisääväksi tekijäksi. Tulokset osoittivat, että navetan työturvallisuutta on mahdollista vähitellen parantaa, kun luodaan myönteinen vuorovaikutussuhde hoitajan ja eläinten välille sekä lisätään eläinten hyvinvointiin ja käyttäytymiseen liittyvää tietämystä. Käytännössä eläimille tarjotaan eläinystävälliset hoitolosuhteet, toteutetaan ennustettavia ja lempeitä rutiineja, totutetaan vasikoita ihmisiin ja vältetään yhden eläinyksilön erottamista muista eläimistä. Eläimiä ei saa hallita pelon avulla, ja hoitotöiden aikana käyttäydytään kärsivällisesti. Hyökkäävän eläimen varalta tulisi olla aina varautunut puolustautumaan.

Naiset tekivät maitotiloilla monia erilaisia työtehtäviä. Miltei kaikki naiset pitivät

luonnonläheistä työtään eläinten parissa palkitsevana, mutta työpäivät olivat pitkiä. Vanhat perinteet voivat luoda näkymättömiä raja-aitoja, jos tavoitteena on järjestää työ aiempaa toimivammalla tavalla laajentaneella maatilalla. Suurin osa naisista halusi olla ammattinimikkeeltään maatalousyrittäjä, mutta heidän ammatillinen asemansa oli usein määrittelemätön tai väärin ymmärretty. Naisten arvokas työpanos maatalouteen ei saisi jäädä unohtuiksi tai ilman tukea. Naisten ammattitaitoa ja osaamista maataloudessa tarvitaan, kun etsitään ratkaisuja tulevaisuuden haasteisiin eli kestäväan maatalouteen, luomutuotantoon sekä eläinten hyvinvoinnin edistämiseen.

Meneillään olevan maatalouden rakennemuutoksen takia maatalousyrittäjien työhyvinvointi tarvitsee tukea. Maatalouden työympäristö sisältää useita riskitekijöitä kuten stressiä, tapaturmavaaroja ja puutteellisesta työkyvystä aiheutuvia hankaluuksia.

Avainsanat:

Maatalous, työhyvinvointi, stressi, oireet, turvallisuus, nainen, työolosuhteet

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Marja Kallioniemi

List of original publications

This thesis is based on the following publications, which are referred to in the text by their Roman numerals.

I Kallioniemi, M. K., Simola, A. J. K., Kymäläinen, H.-R., Vesala, H. T. & Louhelainen, J. K. 2008. Stress among Finnish farm entrepreneurs. *Annals of Agricultural and Environmental Medicine* 15(2): 243–249.

II Kallioniemi, M. K., Simola, A. J. K., Kymäläinen, H.-R., Vesala, H. T. & Louhelainen, J. K. 2009. Mental symptoms among Finnish farm entrepreneurs. *Annals of Agricultural and Environmental Medicine* 16(1): 159–168.

III Kallioniemi, M. K., Raussi, S. M., Rautiainen, R. H. & Kymäläinen, H.-R. 2011. Safety and Animal Handling Practices among Women Dairy Operators. *Journal of Agricultural Safety and Health* 17(1): 63–78.

IV Kallioniemi, M. K. & Kymäläinen, H.-R. 2012. Women on Finnish dairy farms: Hard work in the midst of traditions and changes. *Rural Society* 22(1): 78–89.

V Kallioniemi, M. K., Simola, A., Kinnunen, B. & Kymäläinen, H.-R. 2011. Stress in farm entrepreneurs. In: Langan-Fox J. and Cooper C. L. (Eds.) *Handbook of Stress in the Occupations*. pp. 385–406. Cheltenham, UK and Northampton, MA, USA: Edward Elgar Publishing.

Articles I–IV are original articles. Article V is a literature review and partly based on article I of the dissertation thesis.

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The author's contribution to the original publications

I Marja K. Kallioniemi established the manuscript design and co-operated in the team-based statistical analysis and interpretation of results. She was the main person who conducted the literature review, wrote most of the manuscript and received feedback from co-authors during her work. In addition, she was responsible for the revision of the manuscript and gathered feedback from the co-authors in order to synthesize the published form of the article. She is the corresponding author of the article.

II Marja K. Kallioniemi worked in co-operation with the other authors in deciding the outline of this manuscript and was main person who conducted the literature review. She coordinated the team-based statistical analyses and interpretation of the results. In the writing process she wrote most of the manuscript, receiving guidance and feedback from the other authors. She is the corresponding author of the article.

III Marja K. Kallioniemi was the main planner of the research project and she collected the research material from dairy farms presented in this article. Together with other authors she created the idea and design of the manuscript. She primarily conducted the analytical process. She was responsible for the revision of the manuscript for publication. She is the corresponding author of the article.

IV Marja K. Kallioniemi planned the research project and conducted the farm visits on dairy farms. She was the main researcher conducting the analytical process of the qualitative study. She wrote the manuscript in co-operation with the co-author and was responsible for the revision process. She is the corresponding author of the article.

V Marja K. Kallioniemi took part and coordinated the planning process pertaining to the content of the book chapter and negotiated the distribution of writing tasks with the co-authors. At the end of the writing process she was responsible for the uniformity of content, length and material included in the book chapter. She was also responsible for the revision of the book chapter for publication. She is the corresponding author of the book chapter.

Errata

Article I, page 248, left column

The number of reference should be 15. The sentence in correct form (corrected text with red font):

“By contrast, Melberg [15] found education to lower the stress level among Norwegian farmers.”

Article II, page 159

Abstract, the first sentence; 1994 should be 1992. The sentence in correct form (corrected text with red font):

“The prevalence of mental symptoms among Finnish farm entrepreneurs in 2004 and 1992 was examined in two cross-sectional studies.”

Article V, page 391

Figure 19.1, the third box on the right side. Correct form of the text inside the box (corrected text with red font):

“Mental support from neighbours, friends, relatives, organizations, authorities etc.

Not at all or only a little / no need for support from anyone OR 2.48; 95%
CI: 1.31—4.68

Some or a lot of support / no need for support from anyone OR 2.41; 95%
CI: 1.42—3.25”

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Abbreviations

AFS	Agriculture and forestry sector
a.m.	Ante meridiem (Latin), morning
CATI	Computer assisted telephone interview
CATS	Cognitive Activation Theory of Stress
CI	Confidence intervals
ERI	Effort-Reward Imbalance model
EU	European Union
EU-25	European Union including 25 member countries
EU-27	European Union including 27 member countries
Farm1992	Research project entitled “Farming and Occupational Health in Finland in 1992”, carried out by research and development unit of Kansaneläkelaitos
Farm2004	Research project entitled “Occupational Health and Agriculture in Finland 2004”, carried out by the Finnish Institute of Occupational Health (FIOH)
FIOH	Finnish Institute of Occupational Health
h	Hour
JDC	Job Demand-Control model
min	Minutes
MBI-GS	The Maslach Burnout Inventory, General Survey
MMM	Ministry of Agriculture and Forestry in Finland
N	Number
NIOSH	The National Institute for Occupational Safety and Health of the United States
OR	Odds ratio describing the strength of the association between a predictor variable and a response variable
P	Value that indicates statistical significance
p.m.	Post meridiem (Latin), afternoon
st	Stress
sy	Mental symptom
Tike	Information Centre of the Ministry of Agriculture and Forestry
unadj.	Un-adjusted OR estimates
WHO	World Health Organization
Work2003	A reference sample obtained from the “Work and health” follow-up study in 2003, carried out by the Finnish Institute of Occupational Health (FIOH)

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1 Introduction

During recent decades, agriculture has undergone rapid restructuring in Finland. Since Finland joined the European Union (EU) in 1995, one in three farms has ceased agricultural production and the average size of the remaining farms has increased (Väre, 2010). The production volume has remained approximately the same because production methods have become more efficient, farm sizes have increased and new technologies are in use (Heikkilä & Nurmikko, 2005). Membership of the EU was expected to result in the predictability of agricultural policy, but in reality the changes have been rapid and difficult to foresee. Overall, the risks in agriculture have increased, because relatively high investments are needed and the dependence on political decisions has increased. The decision making in agriculture has been transferred to organizations of the EU, where a small member country has a limited voice (MMM, 2007).

The forces underlying the changes include the process of globalization, which in practise causes fluctuations in prices on the international markets for agricultural products (Bock, 2006). In addition, emerging neoliberal policies demand competitive and “more economically efficient agriculture” (Alston, 2004). It has been assessed (Niemi, 2010a) that Finland has a challenging starting point for competition on agricultural commodity markets because of the northern climate and still rather small average farm size. Webster (2011) presented an interesting categorization of agriculture, which included past, current and also future trends as follows; a) *traditional agriculture* is still a common method with “low input, but sustainable” production, b) *industrial agriculture* produces cheap food with purchased inputs and large units, c) *valued agriculture* and d) *one planet agriculture*

represent more environmental and animal friendly methods underlining food quality and sustainability aspects. The current role of agriculture has also been described as multifunctional, when farms are involved not only in food production but also in food quality, animal welfare, rural development and environmental sustainability (Greer, 2008; Vesala & Vesala, 2010).

Lobao & Meyer (2001) described the situation relating to agriculture in the USA as a process of disappearing farm family businesses, which will have an impact on work roles, hardship and stress. In Finland, agricultural production has also been predicted to develop from traditional family farming towards entrepreneurship with a high turnover and investment costs (MMM, 2007). An enlarged size of the farm enterprise demands new skills to handle the unity of the farm and economic responsibilities (MMM, 2007). Monk (2000) and Lobley et al. (2004) have assessed farm entrepreneurs as being a group ‘at risk’ for increased stress. One factor exacerbating stress is being misunderstood or ‘under-valued’ by the surrounding society (Lobley et al., 2004). A study on the current situation of farmers in Finland with respect to traditions and modernization (Uthardt, 2009) revealed crucial themes, including the feeling of loneliness, stress and an unfair situation compared to other professions. Isolation as a stressor among farmers has also been reported by Deary et al. (1997) and Gregoire (2002). After a year of ethnographic fieldwork among farmers in southwest Finland, Ådahl (2007) concluded that farmers experience limitations related to their autonomy, because new rules from the EU demand them to work in a way that is against their concept of justice. At the same time, economic uncertainty has emerged as a constant situation (Ådahl, 2007). According

to a follow-up study during 1997–2001 (Leskinen, 2004), the social dealings between farm family members and also co-operation with neighbours decreased, indicating a change in values towards more individualistic views. Several studies have informed about a process whereby the farming population has become marginalised, the social status of farmers has declined and at the same they are struggling with modern and traditional norms and ways of life (Elger et al., 1995; Melberg, 2003; Lobley et al., 2004).

People working on Finnish farms (114 214 in total in 2007) are at the core of this study (Figure 1). According to statistics, nearly all (90%) farms are still owned by private persons (Kyyrä et al., 2011), and farming families perform nearly all (89%) of the working hours (Tike, 2011). These facts are supported by Figure 1, which illustrates the minor proportion of salaried workers among the working persons on Finnish farms.

Within this study, persons working on farms are referred to as ‘farm entrepreneurs’ or as ‘farmers’, signifying persons who earn their main living from agriculture. In advanced economies, the same person is often also the owner of the farm. According to Vesala & Vesala (2008), current agricultural policy emphasizes competitiveness, and entrepreneurship is therefore often associated with agriculture today. On the other hand, challenges have also been found in relation to this combination because of socio-cultural circumstances and the special characteristics of agriculture (Pyysiäinen, 2011), as well as the regulated possibilities of farm enterprises (Brandt & Hölsö, 2012). A follow-up survey in 2001 and 2006 among traditional and diversified farmers (Vesala & Vesala, 2008; Vesala & Vesala, 2010) revealed that the majority of traditional farmers and nearly all diversified farmers identified themselves, at least to a certain extent as ‘entrepreneurs’.

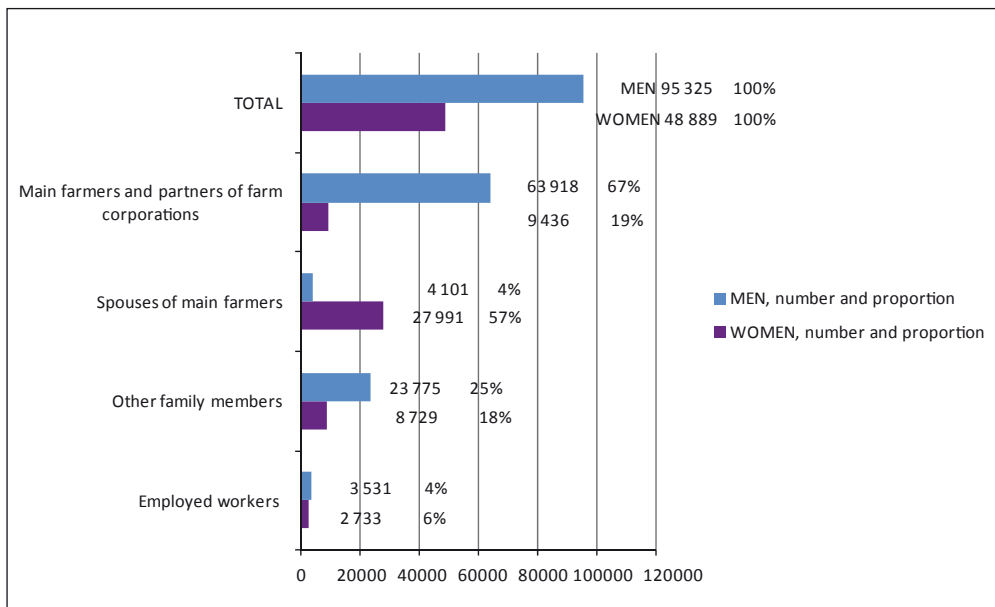


Figure 1. Workers on Finnish farms in 2007 (Tike, 2011).

Altogether, 48 889 women worked in different positions on Finnish farms in 2007 (Figure 1). Most women (57%) working on farms were officially farmers' spouses (Tike, 2011). A challenge for research is to make women's work on farms more visible and discuss the contribution of women to agricultural production.

Human capacity, including work ability, health and coping, has been assessed as a crucial and important element in the success of the farm enterprise (Peltoniemi, 2005). Mental strain may have severe negative impacts on several important spheres such as the productivity of the farm, farm development and the ease of everyday life and practices. In addition, economic problems and stress symptoms have been found to predict farm injuries (Glasscock et al., 2006). It has also been revealed that the stockperson is the main and most important factor related to farm animal welfare issues (Hemsworth & Coleman, 1998; Siegel & Gross, 2000). Furthermore, we should not forget the individual misery and difficulties that mental health problems may cause the individual and the circle of social acquaintances.

Article II includes a comparison of prevalence of symptoms among farm entrepreneurs in the years 2004 and 1992. In addition, articles III and IV are based on farm visits in 2007. The operational environment of agriculture during these years included some basic differences which must be noted as background information. During the 1980s the problems of Finnish agriculture were overproduction and the increased costs of trading overproduced food abroad (Granberg, 2004). In order to direct the costs of the needed foreign trade to the domestic agricultural sector, e.g. a milk quota system was established and a prohibition to invest in animal husbandry buildings was regulated in 1983 (Granberg, 2004). The established

forms of agricultural policy decreased the production levels (Granberg, 2004). The features of ongoing structural change were specialization, development of agricultural production from a way of life into professionalism, increasing farm size and decrease in the number of farms (Vihinen, 2004). Membership of the European Union since 1995 transformed the agricultural policy; profitably decreased and farms were more dependent on subsidies than earlier (Laurila, 2004). The basis of farm income changed, because the amounts of subsidies were mainly based on field hectares and numbers of farm animals, regardless of production levels (Laurila, 2004). Animal husbandry farms used the provided investment possibilities and typically doubled the production level utilizing new technology and farm buildings (Laurila, 2004). Laurila (2004) estimated that membership of the EU was not an easy process for Finnish agriculture, but that despite this in 2004 about 80% of consumed food in Finland was of domestic origin. By 2008, the corresponding share was still 75% (Niemi et al., 2013).

This dissertation research included two main samples (Figure 2). Articles I and II focus on full-time farm entrepreneurs in Finland based on a telephone survey (N = 1 182). According to quantitative research results, feelings of stress and perceived stress symptoms are indicators of well-being at work. Articles III and IV present qualitative studies on women working on dairy farms. As the farm sizes and numbers of farm animals per a farm have been increasing, the occupational safety of the stockperson (III) is a significant element of well-being at work. Finally, the positive and negative elements in women's working conditions on farms have been studied (IV). The framework of the thesis, including the core theme, three approaches and example features of the operational environment, is presented in Figure 2.

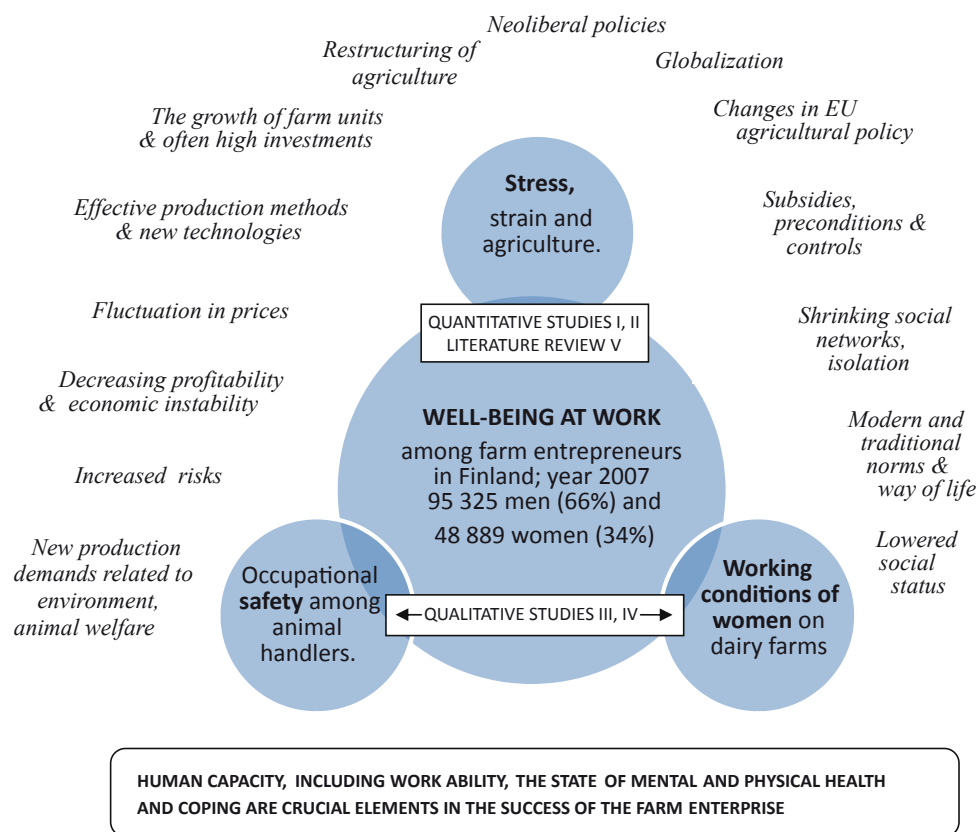


Figure 2. The framework of the thesis. The core theme is well-being at work among farm entrepreneurs studied with three approaches. Example factors describing changes in the operational environment are mentioned around the figure.

The thesis may be considered as interdisciplinary. Themes such as well-being at work, stress and symptoms are rooted in psychology. Occupational safety and safety promotion on farms are rooted in safety science and agricultural engineering. Working conditions are rooted in work science. In addition, the study focusing on female respondents with conclusions including suggestions to improve the work situation of women has its basis in women's studies. Finally, working conditions with traditions, norms and customs are rooted in cultural studies. Both quantitative (survey) (I, II and V) and qualitative (III, IV) research methods were used, with positivistic and hermeneutic, interpretative research

traditions (Denzin & Lincoln, 2003; Tuomi & Sarajärvi, 2006). The thesis utilizes mixed methods research (Bergman, 2010; Denscombe, 2010) to study the main theme of well-being at work as it combines the quantitative and qualitative approach, different research traditions and with different kinds of knowledge (Metsämuuronen, 2008). A wide survey was able to provide information about stress and stress symptoms among full-time Finnish farmers with a large sample size (N = 1 182), while farm visits to ten dairy farms provided knowledge about the everyday situations, reality, social settings and mindsets of farm women working on dairy farms.

2 Review of the literature

Psychological well-being is a broad, 'multifaceted' concept and no widely accepted definition is therefore available (Hassmén et al. 2000; Warr, 2012). Warr (2012) notes the meaning of the words 'well' and 'being', which refer to a positive life. Because the insights into a positive and good life are variable, there have been many methods to measure psychological well-being. An important basic assumption is that different personal experiences of well-being at work depend on individual characteristics (Feldt et al., 2005). The World Health Organization (WHO, 1986) presented a definition of human well-being as follows: "a dynamic state of mind characterized by reasonable harmony between a person's abilities, needs and expectations, and environmental demands and opportunities". Well-being is one element of health (WHO, 1986), which is "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity".

Kinnunen & Feldt (2005) noted how research on well-being at work during past decades has focused on negative outcomes such as stress and burnout. Therefore, the absence of these negative outcomes has been assessed as indicating a state of well-being. For example, within the study by Hassmén et al. (2000), psychological well-being was measured as a low level

of depression, anger, hostility and stress. Recently, positive dimensions of well-being at work have also been investigated, such as work engagement (Hakanen, 2005; Mäkikangas et al., 2005). Within the study by Hassmén et al. (2000), feelings of social integration and the state of health and fitness were additionally included in the analysis.

Danna & Griffin (1999) presented a framework (Figure 3) entitled "Organizing and Directing Future Theory, Research and Practice Regarding Health and Well-Being in the Workplace", in which well-being in the workplace has two main elements: a) satisfaction related to life and work and b) the state of physical and mental health. The articles of this thesis could be placed in this framework (Danna & Griffin, 1999): articles I, II and literature review V pertain to 'antecedent' occupational stress and article III pertains to the 'work setting', which includes safety hazards. Article IV on the working conditions of women relates to the 'work setting' and 'personality traits' and 'occupational stress' (Danna & Griffin, 1999) with a qualitative, holistic approach. Based on these aspects, the following review of the literature focuses on discussing three themes: stress, safety in animal handling and the working conditions of women on farms.

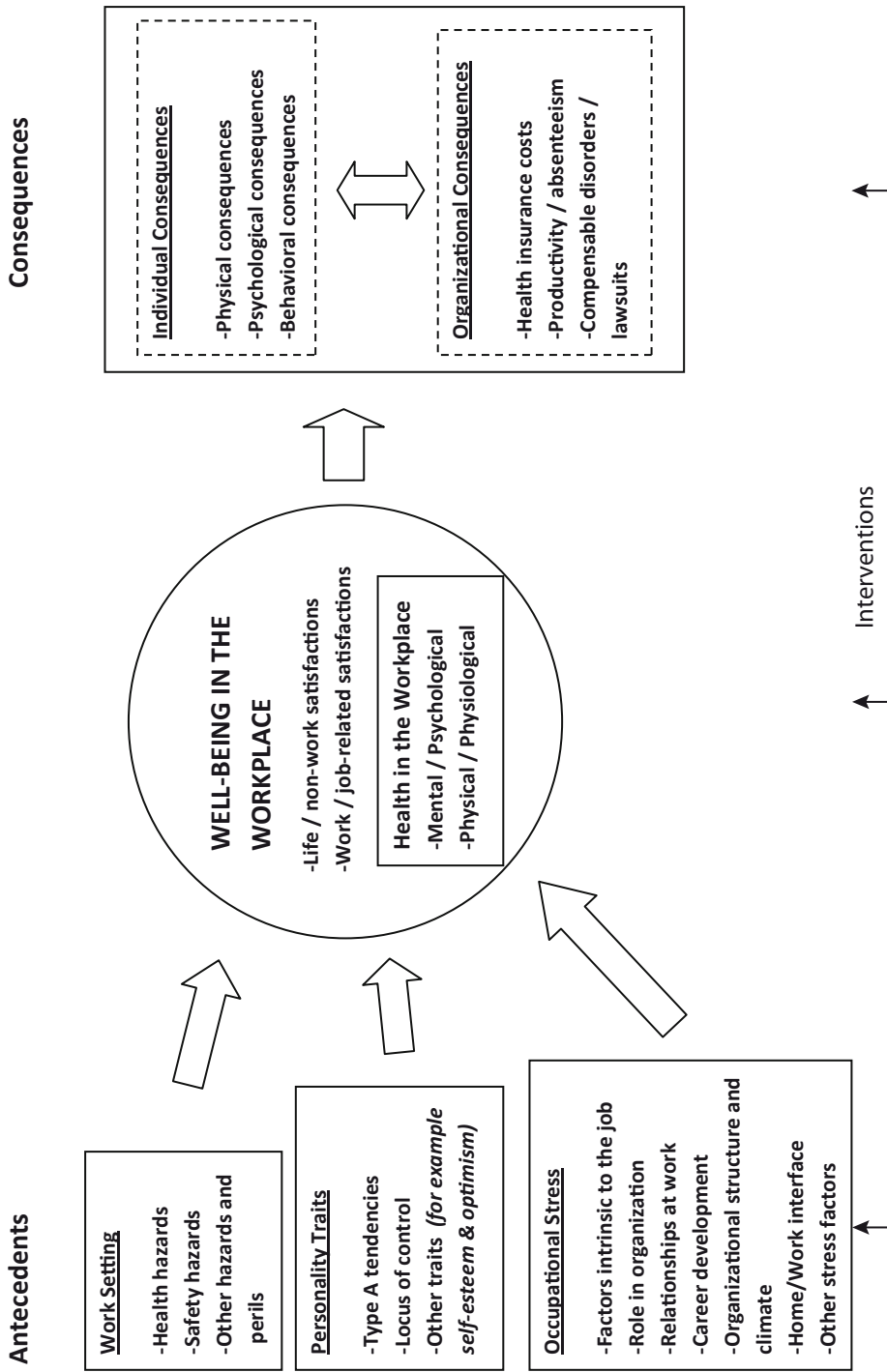


Figure 3. A framework for “Organizing and Directing Future Theory, Research and Practice Regarding Health and Well-Being in the Workplace” (Danna & Griffin, 1999). Reproduced here with permission (obtained April 10, 2012) from Professor Ricky W. Griffin. The text in *italics* is added information (Feldt et al., 2005).

2.1 Stress

According to the Fourth European Working Conditions Survey conducted in 2005, stress was the second most common work environment danger in general within the European Union after musculoskeletal problems (Parent-Thirion et al., 2007). Every fifth (22%) working European experienced stress (in 27 member countries) (Milczarek et al., 2009). The occupational sector of 'skilled agricultural and fishery workers' was distinguished among the study results by three aspects. First, the highest prevalence of stress (32%) was observed among workers in this sector. Secondly, the largest percentage growth in the prevalence of stress was observed among skilled agricultural and fishery workers compared to the previous follow-up study in 2000. Thirdly, the only occupational sector in which the prevalence of stress increased between the follow-up studies was that of agriculture, hunting, forestry and fishing (Milczarek et al., 2009). It must be noted that this information also includes workers within hunting, forestry and fishing sector in addition to agricultural workers, although the latter is clearly the main sector.

Definitions of stress

The term stress was introduced by Hans Selye in 1949 (Ursin & Eriksen, 2004), as he described how several different environmental insults may induce the same kind of physical reaction among different human individuals. He began to use the terms 'stress' to refer to these observed physical reactions and 'stressors' for environmental insults that elevated the stress reaction. Hans Selye also distinguished two forms of stress. *Eustress* is a positive phenomenon, as it enables a person to use additional resources and adapt to new situations (Donham & Thelin, 2006). This positive, good stress is a stimulating feeling and it is crucial for motivation, growth, development

and better human performance (Rout & Rout, 2002). The opposite term *distress* is a negative form of stress, as it may cause detrimental symptoms or diseases (Donham & Thelin, 2006). The physiological reactions to stress in a human body may include the release of adrenaline and noradrenaline into the bloodstream, the speeding-up of reflexes, an increase in sweating, and a rise in the blood sugar level, blood pressure, heart rate and respiration (Rout & Rout, 2002). This process is described within "a model of stress at work" in Figure 4 (Cooper & Marshall, 1976), in which different kinds of stressors possibly cause symptoms and diseases. Stressors can be *external*, such as negative conditions of the psychological environment, or *internal*, referring to physical or psychological insults. The duration of stressors may be short term (acute) or long term (chronic) (Lobley et al., 2004).

Although stress has been studied for several decades, Lobley et al. (2004) argued that a holistic definition of stress including medical, physical and socio-emotional aspects is still lacking (also Kahn & Byosiere, 1992; Cox et al., 2000; Rout & Rout, 2002; Griffin & Clarke, 2010; Kopp et al., 2010). On the other hand, the basic element of stress definitions is an imbalance between the work requirements and an individual worker's capacity, skills, resources or needs. This imbalance may induce harmful physical and emotional responses (NIOSH, 1999). Cox et al. (2000) described stress as a psychological state, which is "part of and reflects a wider process of interaction" between human beings and their environment.

European Agency for Safety and Health at Work (2002) defines work-related stress as a situation where "the demands of the work environment exceed the workers' ability to cope with (or control) them" (also Gray, 1998; Cox et al., 2000; Milczarek et al., 2009). The National

A MODEL OF STRESS AT WORK

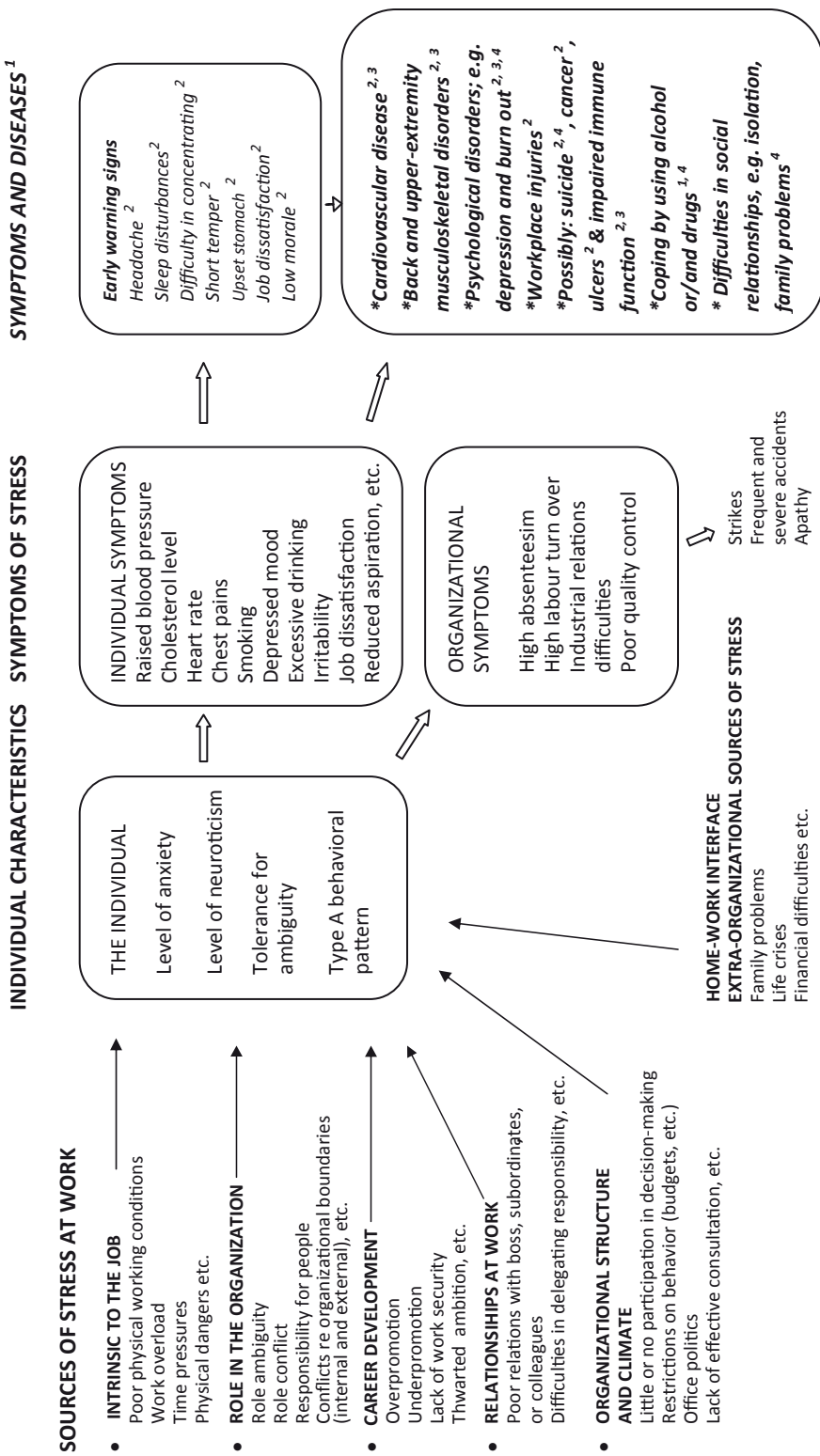


Figure 4. "A model of stress at work" (Cooper & Marshall, 1976). The model is reproduced with permission (obtained March 30, 2012) from Professor Cary L. Cooper. The list of symptoms and diseases in *italics* is from Jones et al. (1994) (1), NIOSH (1999) (2), Sonnentag and Frese (2003) (3) and Mattila (2010) (4).

Institute for Occupational Safety and Health, USA (NIOSH, 1999), underlines that working conditions have the primary role in elevating work stress, and that existing stressors may influence the health and safety of workers. Nevertheless, the situation is not straightforward, as other factors related to working conditions and personality may either intensify or weaken the effect of stressors (NIOSH, 1999). These moderating factors may include social support and respect from colleagues and friends (see also Sonnentag & Frese, 2003; Elo et al., 2012), the balance between personal, private life and work duties (NIOSH, 1999), control at work and self-efficacy (Sonnentag & Frese, 2003) and leadership at work (Elo et al., 2012). In addition, a casual and positive attitude towards life buffers against stressful working conditions (NIOSH, 1999). Stress is not an illness, but when it is long-lasting and has a certain intensity, stress may lead to a process that results in mental or physical disease (Figure 4) (Cooper & Marshall, 1976; Jones et al., 1994; NIOSH, 1999; Sonnentag & Frese, 2003; Mattila 2010).

Theoretical approaches to stress

Several different types of theoretical approach have been developed for work stress. In addition, several disciplines such as psychology, medicine, public health, engineering, economics and sociology have described the nature of stress (Griffin & Clarke, 2010). Different stress models have similar features (Griffin & Clarke, 2010), but these underline diverse issues such as environmental demands, a person's reactions to the demands or the results of the demands. Within different stress models, Griffin & Clarke (2010) distinguished two basic processes:

a) the type of evaluation and response a person experiences during exposure to the environmental circumstances and

b) time as an element, including the short- and longer-term interaction between a person and the environment.

The five presented models are listed below:

- a) Warr's vitamin model (Warr, 1990),
- b) The role stress model (Kahn & Byosiere, 1992),
- c) The job demand-control (JDC) model (Theorell & Karasek, 1996),
- d) The effort-reward imbalance (ERI) model (Siegrist et al., 2004) and
- e) The cognitive activation theory of stress (CATS) (Ursin & Eriksen, 2004).

The reasons for presenting the five selected models here are the following. The job demand-control (JDC) model (Theorell & Karasek, 1996) and effort-reward imbalance (ERI) model (Siegrist et al., 2004) are both perhaps the most commonly used and presented models (Lindström et al., 2002). These models provide basic information on stressful situations and human reactions. Furthermore, Warr's vitamin model (Warr, 1990) and the cognitive activation theory of stress (CATS) (Ursin & Eriksen, 2004) are more sophisticated models, as they both provide a wider approach to well-being. Warr (1990) described dimensions from anxious to contented and from depressed to enthusiastic. This model (Warr, 1990) is not only about stress, although it provides a general theoretical framework in which stress is included (Griffin & Clarke, 2010). As a concurrent model, Ursin and Eriksen (2004) also described the process leading from the stressor or emotional load to depression and post-traumatic stress disorder. The role stress model (Kahn & Byosiere, 1992) is introduced here because work roles creating stress have been one of the first and most fruitful stress approaches studied (Griffin & Clarke, 2010). In addition, role conflicts have been assessed as a stressor among farm women (Keating, 1987), and

the work situation of farm women is also described as comprising many and partly overlapping responsibilities (Carruth & Logan, 2002; Heather et al., 2005).

Warr's vitamin model, or the approach to affective well-being, was presented by Peter Warr (Warr, 1990) (Figure 5). This model assumes the relationships between different work characteristics and well-being to be curvilinear. Peter Warr used an allegory concerning vitamins to describe the impacts of different work characteristics. At first, a certain amount of a work characteristic has a positive impact on well-being, but a greater amount of the same work characteristic does not have any beneficial impact. On the contrary, the impact may even be negative. Warr (1990), complemented by Hakanen (2005) and Kinnunen and Feldt (2005), described the approach to affective well-being as a figure (Figure 5) with axes of displeased – pleased (horizontal dimension) and positive and

negative arousal (vertical dimension). In addition, two diagonal axes describe the dimensions of well-being: depressed – enthusiastic and anxious – contented. The diagram is not a circular, but instead the model is described with an oval round, because pleasure is “accorded greater weight” than arousal (Warr, 1990).

In addition, Warr (1994) has listed features related to work that he considers as essential to well-being at work. These features are the independence of work, the demands of work, social support, the possibility to use skills, the diversity of tasks and feedback. These features initially have a positive impact, but after a certain point the increase in these features starts to have negative impacts. The following four features of work do not have negative impacts, even at high levels: salary, safety, respect and support from the supervisor. Kinnunen & Feldt (2005) described how Warr's vitamin model has received some

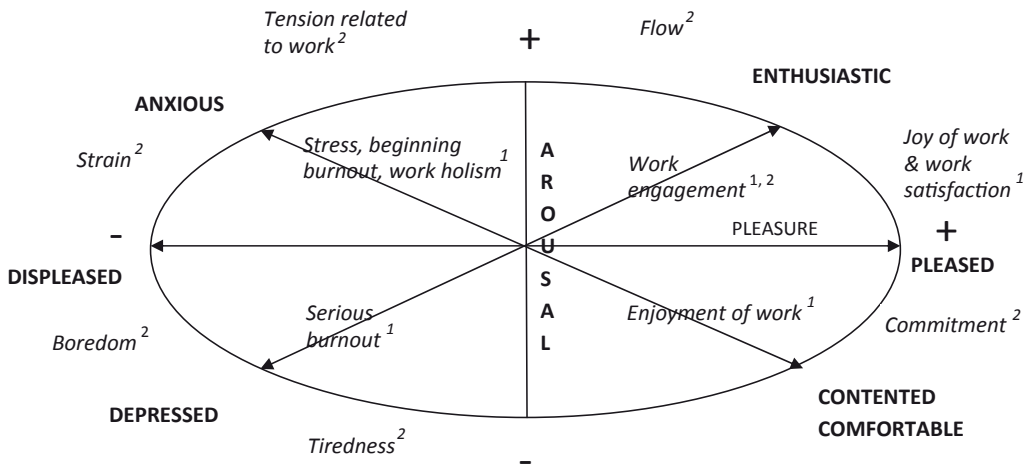


Figure 5. Warr's vitamin model, the approach to affective well-being (Warr, 1990), or the “framework for the study of work and mental health” (Warr, 1994). The text in *italics*¹ is complemented information from Hakanen (2005) and that in *italics*² is complementary information from Kinnunen & Feldt (2005). Permission to reproduce this figure has been obtained from Peter Warr (April 5, 2012) and Jari Hakanen (April 3, 2012).

support from other studies, but results have also been ambiguous. Overall, this non-linear model has been assessed as being ahead of its time, and more research is now being focused on assessing its reliability (Kinnunen & Feldt, 2005).

The role stress model (Kahn & Byosiere, 1992) presents the interaction of role and positional location as a role stressor. Role conflict is described as ‘perceptual differences’ related to the content of the role or the real significance of these elements. This kind of conflict may elevate negative outcomes, tension and physical symptoms (Kahn & Byosiere, 1992). Role ambiguity is a situation where the requirements of different roles are contradictory. Finally, role overload reveals as a situation where a person is forced to “compromise either quantity, time schedule, or quality” (Kahn & Byosiere, 1992). It has been assessed that role conflict and role ambiguity are the two stressors that have been most often studied in research projects related to organizations (Griffin & Clarke, 2010). This stress model has received support from several studies (Griffin & Clarke, 2010).

The job demand-control (JDC) model was developed by the sociologist Robert Karasek and cardiologist Töres Theorell (Figure 6) (Theorell & Karasek, 1996). In this model, two dimensions, ‘decision latitude’ and ‘psychological demands’, vary from low to high in a matrix. If the decision latitude and psychological demands are both on a low level, the work situation is estimated as ‘passive’. If the decision latitude is high and psychological demands are also high, the work situation may be stimulating and ‘active’. Work may provide new skills and knowledge to study and the activation of workers may possibly increase (Theorell & Karasek, 1996). The situation may also be negative and stress-elevating if the decision latitude is low and psychological demands are high. The dimension of time may be included in this model. Over time the stimulating, ‘active’ work situation elevates the ‘feeling of mastery’. Conversely, a long-lasting stressful work situation may be associated with cumulated strain. A worker may suffer from exhaustion and burnout (Theorell & Karasek, 1996).

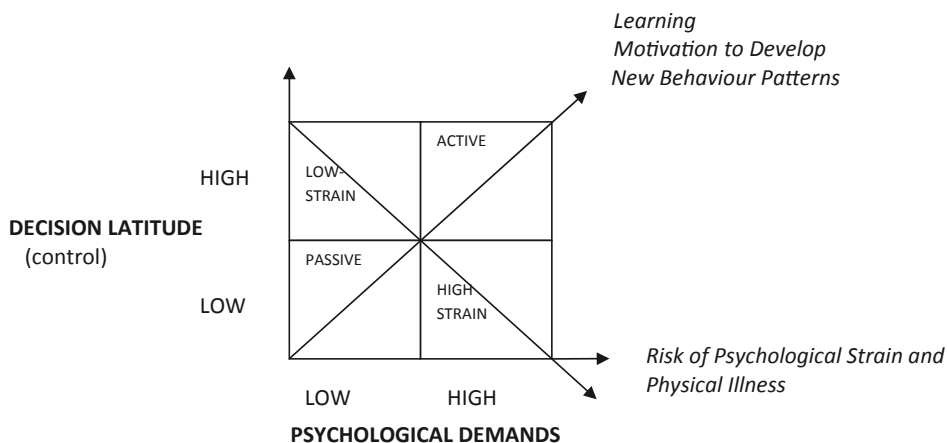


Figure 6. The job demand-control (JDC) model of stress (Theorell & Karasek, 1996). Permission to reproduce the figure was obtained from Professor Töres Theorell (April 16, 2012).

The model of effort-reward imbalance (ERI) at work was developed by sociologist Johannes Siegrist (Siegrist et al., 2004). The main assumption related this model is that workers' efforts, and on the other side the rewards of work such as the salary, respect, career development, work security and other benefits are not in balance (Siegrist et al., 2004). Situations where the efforts are on a high level but the rewards are poor elevate negative strain and may increase the possibility of illness. Different persons may have different kinds of motivation related to work; someone may accept high work demands but feel frustrated because the rewards are low after hard efforts. This person's work motivation is described as overcommitment. The model is based on sociological understanding of social exchange, which is based on an agreement about reciprocity related to costs and benefits (Siegrist et al., 2004).

Kinnunen & Feldt (2005) distinguished three different hypotheses. First, the external ERI hypothesis is described as a situation where high efforts combined with poor rewards adds to the risk of illness. Secondly, the intrinsic hypothesis about overcommitment is a situation where high efforts may increase the risk of illness, because a worker's own observations about his or her efforts and resources are distorted. Thirdly, the hypothesis of interaction reveals that especially those persons who have characteristics of both earlier hypotheses have a high risk of becoming ill (Kinnunen & Feldt, 2005).

Research results concerning organizational justice reveal not only that high effort combined with low rewards induces feelings of distress and increases ill health, but also that organizational justice is associated with self-rated health, minor psychiatric disorders and absence due to illness (Elovainio et al., 2002). Organizational justice includes the

procedures used in an organization, such as available information about the decisions made and the possibility to "appeal or challenge the decisions". In addition, the behaviour of the supervisor with features such as taking into account employee rights, whereby the employee is "dealt with in a truthful manner", is included in the concept of organizational justice (Elovainio et al., 2002).

The cognitive activation theory of stress (CATS) (Ursin & Eriksen, 2004) was developed by Holger Ursin and Hege R. Eriksen. First, four different meanings are distinguished by the word 'stress', namely stress stimuli, stress experience, the stress response in general and the experience of the stress response. Stress stimuli may also be referred to as stressors or the emotional load. The stress response may be either positive 'training' or negative 'strain'. A human may have previous experiences of the stimulus or stressor, and based on this information the brain changes the stimulus or the conception of the stimulus (Ursin & Eriksen, 2004). Humans may react according to the stress stimuli with the following strategies: a) coping is positive reaction and the person believes in positive results after the stressful situation; b) helplessness is a situation where the person does not react, and he or she does not know what kind of results there will be, and c) hopelessness is a negative reaction in which the person does not consider any possibilities to improve the situation. Ursin and Eriksen (2004) considered that depression may be expressed as hopelessness and post-traumatic stress disorder as helplessness. If the person tries to cope but is unsuccessful, the situation may be considered as helplessness. If this lasts a long time, the subsequent arousal may cause changes in hormone levels, immune variables and brain biochemistry (Ursin & Eriksen, 2004). Support from society may reduce stress.

Symptoms of stress

As a consequence of stress, a person may experience different symptoms. Numerous publications have described or listed stress symptoms (Cooper & Marshall, 1976; Jones & DuBois, 1987; Kahn & Byosiere, 1992; Jones et al., 1994; NIOSH, 1999; Sonnentag & Frese, 2003; Mattila, 2010; Ahola & Lindholm, 2012; Anxiety Disorders Association of America, 2012). Stress symptoms, grouped into physical, emotional, psychological, thinking and behavioural symptoms (Jones et al., 1994), are presented in Tables 1 to 4. Later, as a

part of this thesis, article I uses a question developed in the early 1970s to enquire about stress feelings (Elo et al., 1999; Elo et al., 2003). The question is based on symptom checklists. Lobleby et al. (2004) published a literature review entitled “Rural Stress Review” in which stress symptoms were presented as a figure based on the work of Jones et al. (1994) and Jones & DuBois (1987). The references of stress symptoms mainly focus on occupational stress or stress in organizations (Cooper & Marshall, 1976; Jones & DuBois, 1987; Kahn & Byosiere, 1992; NIOSH, 1999; Sonnentag & Frese, 2003). Jones et al.

Table 1. Physical stress symptoms according to different reference sources.

Physical symptoms, (number of sources)	Cooper & Marshall, 1976	Jones & DuBois, 1987	Kahn & Byosiere, 1992	Jones et al., 1994	NIOSH, 1999	Sonnentag & Frese, 2003	Mattila, 2010	Ahola & Lindholm, 2012	Anxiety Disorders Association of America, 2012
Nausea (2)	-	-	-	X	-	-	X	-	-
Shortness of breath (1)	-	-	-	X	-	-	-	-	-
Headache (4)	-	-	-	X	X	-	X	-	X
Backache (2)	-	-	-	X	-	-	X	-	-
Dizziness (2)	-	-	-	X	-	-	X	-	-
Exhaustion (1)	-	-	-	X	-	-	-	-	-
Palpitations, cardiac activity, elevated heart rate or health breakdowns (cardiovascular, etc.) (7)	X	X	X	X	-	X	X	-	X
High blood pressure (4)	X	-	X	-	-	X	-	-	X
Chest pain (2)	X	-	-	-	-	-	-	-	X
Skin rashes (1)	-	-	-	-	-	-	-	-	X
Upset stomach, gastric symptoms (3)	-	-	X	-	X	-	X	-	-
Increased level of cholesterol (3)	X	-	X	-	-	X	-	-	-
Catecholamine and cortisol level (2)	-	-	X	-	-	X	-	-	-
Adrenaline and nonadrenaline (1)	-	-	-	-	-	X	-	-	-
Effect on immune system (2)	-	-	-	-	-	X	X	-	-
Aches and pains (1)	-	-	-	-	-	-	-	X	-
Perceived functional disorders of the body (1)	-	-	-	-	-	-	-	X	-

X symptom is mentioned in the publication; - symptom is not mentioned in the publication

Table 2. Emotional and psychological stress symptoms according to different reference sources.

Emotional symptoms, (number of sources)	Cooper & Marshall, 1976	Jones & DuBois, 1987	Kahn & Byosierte, 1992	Jones et al., 1994	NIOSH, 1999	Sonntag & Frese, 2003	Mattila, 2010	Ahola & Lindholm, 2012
Apathy, hopelessness, lack of vigour, frustration or reduced aspiration (5)	X	X	X	X	-	-	-	X
Anger (3)	-	-	X	X	-	-	X	-
Anxiety or restless (3)	-	X	-	X	-	-	X	-
Despair, helplessness (3)	-	-	X	X	-	-	-	X
Fatigue (2)	-	X	X	-	-	-	-	-
Fear (1)	-	-	-	X	-	-	-	-
Depression or depressed mood (6)	X	X	X	X	-	X	X	-
Ideas of unworthiness, lowered self-confidence and self-esteem (2)	-	-	X	X	-	-	-	-
Excitement (2)	-	-	-	X	-	-	X	-
Job dissatisfaction (4)	X	X	X	-	X	-	-	-
Frustration or boredom (2)	-	X	X	-	-	-	-	-
Burnout (2)	-	-	-	-	-	X	X	-
Psychosomatic complaints (1)	-	-	-	-	-	X	-	-
Dissatisfied (1)	-	-	-	-	-	-	-	X
Lack of well-being (1)	-	-	-	-	-	-	-	X

X symptom is mentioned in the publication, - symptom is not mentioned in the publication

Table 3. Stress symptoms related to thinking according to different reference sources.

'Thinking' symptoms (number of sources)	Jones & DuBois, 1987	Jones et al., 1994	NIOSH, 1999	Sonntag & Frese, 2003	Mattila, 2010	Ahola & Lindholm, 2012
Preoccupation (1)	-	X	-	-	-	-
Forgetfulness or reduced working memory (4)	-	X	-	X	X	X
Poor judgement or decisions (4)	X	X	-	-	X	X
Poor concentration or reduced accuracy (4)	-	X	X	X	-	X
Obsessional ideas (1)	-	X	-	-	-	-
Over-inclusive thinking (1)	-	X	-	-	-	-
Over-generalized thinking (1)	-	X	-	-	-	-
Self-attribution of blame (1)	-	X	-	-	-	-
Low morale or thefts (2)	X	-	X	-	-	-
Difficulties in planning (1)	-	-	-	-	-	X
Lack of enterprise (1)	-	-	-	-	-	X
Nagging suspicion about one's own ability to cope (1)	-	-	-	-	-	X

X symptom is mentioned in the publication, - symptom is not mentioned in the publication

Table 4. Behavioural stress symptoms according to different reference sources.

Behavioural symptoms (number of sources)	Cooper & Marshall, 1976	Jones & DuBois, 1987	Kahn & Byosiere, 1992	Jones et al., 1994	NIOSH, 1999	Sonnentag & Frese, 2003	Mattila, 2010	Ahola & Lindholm, 2012	Anxiety Disorders Association of America, 2012
Withdrawal or alienation (4)	-	-	X	X	-	-	X	X	-
Argumentation (1)	-	-	-	X	-	-	-	-	-
Aggression, hostility or violence (4)	-	-	X	X	-	X	X	-	-
Sleep disturbances, unable to sleep or insomnia (6)	-	X	-	X	X	-	X	X	X
Complaint about health or increased sick leave (2)	-	X	X	-	-	-	-	-	-
Alcohol abuse (4)	X	X	-	X	-	-	X	-	-
Procrastination (1)	-	-	-	X	-	-	-	-	-
Impulsive and critical towards others, antagonistic group action or conflicts (5)	-	X	-	X	-	X	X	X	-
Lack of commitment to the organization or disloyalty (4)	X	X	X	-	-	X	-	-	-
Short temper, irritation, nervousness or tension, lack of self-control (6)	X	X	X	-	X	-	X	X	-
Poor performance, narrowed attention or reduced productivity (4)	X	X	X	-	-	X	-	-	-
Increase in effort (1)	-	-	-	-	-	X	-	-	-
Difficulties to relax and recover (2)	-	-	-	-	-	X	-	X	-
Occurrence of accidents and errors (3)	-	X	X	-	-	X	-	-	-
Unpredictability, difficulties to control (1)	-	-	-	-	-	-	-	X	-

X symptom is mentioned in the publication, - symptom is not mentioned in the publication

(1994) focused on rural stress and Anxiety Disorders Association of America (2012), Mattila (2010) and Ahola & Lindholm (2012) discussed stress in general. Mattila (2010) emphasized that although the stress experience is psychological, the influences on human beings may be physical or mental. Consequences of severe stress may be depression, burn-out, misuse of intoxicants or suicidal tendencies. Stress may also cause difficulties in social relationships, such as family problems or isolation.

Measurement of stress

As mentioned earlier, no generally accepted definition of stress is available (Kahn & Byosiere, 1992; Cox et al., 2000; Rout & Rout, 2002; Griffin & Clarke, 2010; Kopp et al., 2010). Therefore the measurement of stress is not a simple task and several kinds of methods have been developed (Rantanen et al., 2001; Kopp et al., 2010). According to Kopp et al. (2010) measurement may focus on a) the environmental approach emphasizing the existence of stressors, or b) the psychological approach considering a person's own assessment about reactions

to stress or measurements of these reactions or c) the biological approach focusing on physiological measurements. Ahola et al. (2012) stated that simple and reliable physiological methods to measure stress have not yet been found, but that these measurements may add the information about stress level changes and recovering. Elo et al. (2003) concluded that the methods used in working life are not always inclusive, especially those methods included in follow-up research surveys.

Current discussion about methods to measure stress has highlighted those methods which are based on personally assessed stress feelings and experiences (Kopp et al., 2010). Such methods are currently the most commonly used. Ursin & Eriksen (2004) also described the experience or feeling of stress as perhaps the most relevant in human stress research in working life. Similarly Cox et al. (2000) stated that measurements of stress should be based on enquiring about the emotional experience of stress by self-report measures, although the problematic deficiency is the validity. On the other hand, Noble (2002) argued for a personal “medical interview” as the most feasible method to diagnose stress where e.g. stressful life experiences and economical problems are queried and the effects of these experiences are discussed.

Within epidemiological studies, “shortened stress measures” are often in use (Kopp et al., 2010), but there is no agreement about whether these methods are appropriate. Stress is a complex phenomenon and therefore it is difficult to measure with a simple question. The positive features of these short methods are that they are easy to answer and inexpensive to use. As an example, the fourth European Working Conditions Survey (Parent-Thirion et al., 2007) examined the prevalence of stress using the following question: “Does your work affect your health, or not?” If the answer was ‘yes’, the following question

was: “How does it affect your health?” The interviewer mentioned 16 effects, of which the alternative ‘stress’ was the eleventh; alternatives to answer were: mentioned, not mentioned, DK (do not know) or refusal (Rantanen et al., 2001).

Within article I of this thesis, stress was measured with a question (Elo et al., 2003) in which the term ‘stress’ was first defined to the respondent and different kinds of stress symptoms were listed. These symptoms represented mainly negative outcomes of stress: “tense, restless, nervous or anxious or is unable to sleep at night because his/her mind is troubled all the time” (Elo et al., 2003). The respondent was then asked whether she or he currently felt this kind of stress. The respondent’s own assessment of her or his environment and of himself or herself has been considered as a suitable approach to measure stress (Elo et al., 1990), because self-assessment is combined with the respondent’s decisions, actions and work performance. The process of stress may for a long time be internal and therefore during this first phase the person him/herself is the only one who is able to observe it (Ahola et al., 2012). Elo et al. (2003), Ahola et al. (2012) and Elo et al. (2012) assessed this question as applicable to determine stress at the group level, but it was not able to measure a single person’s well-being or state of mental health. Rantanen et al. (2001) included this question as an indicator of working conditions, psychosocial factors and stressful work.

The Finnish Institute of Occupational Health (FIOH) carries out a telephone survey every third year in order to study working conditions and well-being among Finnish citizens (Kauppinen et al. eds., 2010). This survey included the mentioned stress question (Elo et al., 2003) (I,V). A sample of Finnish citizens (in 2009; N = 2 282) is available as a reference sample (Ahola et al., 2012; Elo et al., 2012) to be used in other, smaller

surveys among other occupational sectors. The question about stress is included in TyöstressikyselyTM [Work stress enquiry], which was developed in 1990 (Elo et al., 1990; Elo et al., 2012) by FIOH.

The validity of this single-item measure of stress symptoms has been assessed, focusing on four independent cross sectional data sets (Elo et al., 2003); among post office personnel in Finland (N = 1 014), a sample of different occupational sectors from Denmark, Finland, Norway and Sweden (N = 1 015), workers in a metal factory in Finland (N = 773) and a random sample of the Finnish working population (N = 2 156). The content validity was studied (Elo et al., 2003) within the first data set of post office personnel by factor analysis, the maximum likelihood method and varimax rotation; within the second data set of different occupational sectors by Pearson's product-moment correlations and factor analysis; within the third data set of workers in the metal factory by Pearson's product-moment correlations and within the fourth data set of the Finnish working population by discriminate power and comparison with the prevalence of emotional exhaustion. It was concluded that several item scales related to work stress could be substituted with this single-item question. The question about stress was concluded to be satisfactory concerning the content, criterion and construct validity (Elo et al., 2003). The clearest association was observed with psychological symptoms, sleeping problems, mental resources and physical symptoms. In addition, this single-item measure of stress was associated with "validated scales measuring mental well-being" (such as the general Health Questionnaire and the Short-form 36-item Health Survey) and negative work characteristics such as work overload (Elo et al., 2003).

2.2 Safety

Safety and agriculture

Agriculture is still among the most dangerous occupations. The European Union's strategy on health and safety at work (Commission of the European communities, 2002) mentions four occupational sectors that have an injury rate of 30% higher than on average: fishing, agriculture, construction and health and social services. In Finland (Tilastokeskus, 2011), the frequency of occupational injuries (at least 4 days disability) among farm entrepreneurs is over two times greater (4 897 injuries per 100 000 entrepreneurs) than among employed workers (2 008 injuries per 100 000 workers) (Figure 7). During 2000–2006, on average 7% of farm entrepreneurs suffered one or several injuries; this rate was 8% among male farmers and 5% among female farmers (Taattola et al., 2007). Injury ratios followed a declining trend among both female and male farm entrepreneurs in Finland during 2007–2009 (Figure 7) (Tilastokeskus, 2009; 2010 and 2011). Despite this, the prevalence of severe farm injuries is still high (Taattola et al., 2010). During 2006–2009 there were on average 7 occupational deaths per 100 000 among farm entrepreneurs per year (Tilastokeskus, 2011). In 2009 the corresponding figure among employed workers was only 1.2 deaths per 100 000 workers. Eurostat (2012) have gathered statistical information about accidents at work among the occupational sector 'agriculture, hunting and forestry' per 100 000 persons employed. The accidents included in the survey caused more than three days' absence from work. The figures for 2007 from the Nordic countries Sweden, Norway, Denmark and Finland are presented in Figure 8. In 2007, the incidence rate in Finland was about on the same level as in other Nordic countries. The accident rate for Iceland was not available.

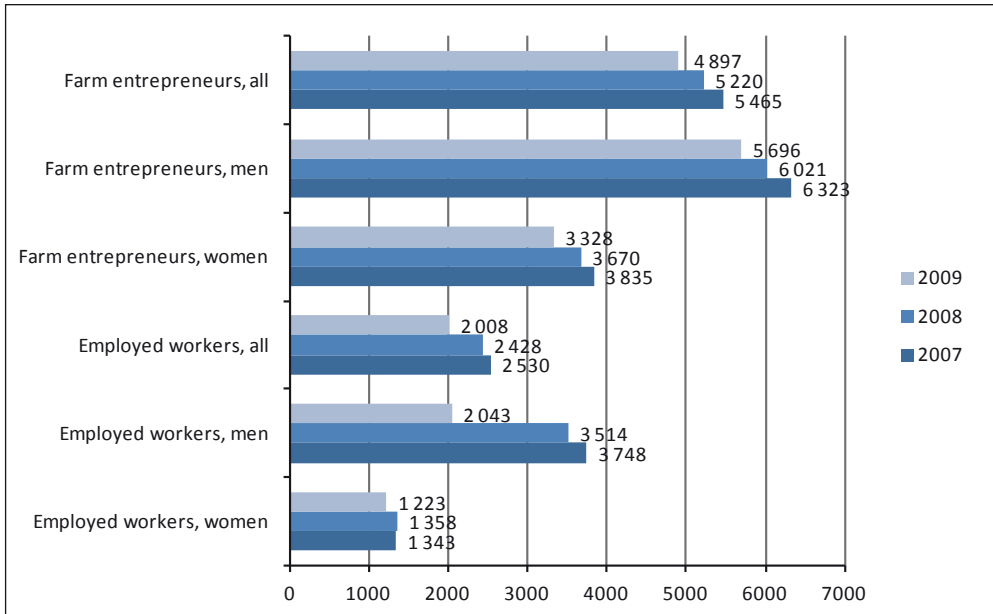


Figure 7. The frequency of injuries (at least 4 days disability) per 100 000 persons among farm entrepreneurs and employed workers in Finland during 2007–2009 (Tilastokeskus, 2009; 2010; 2011).

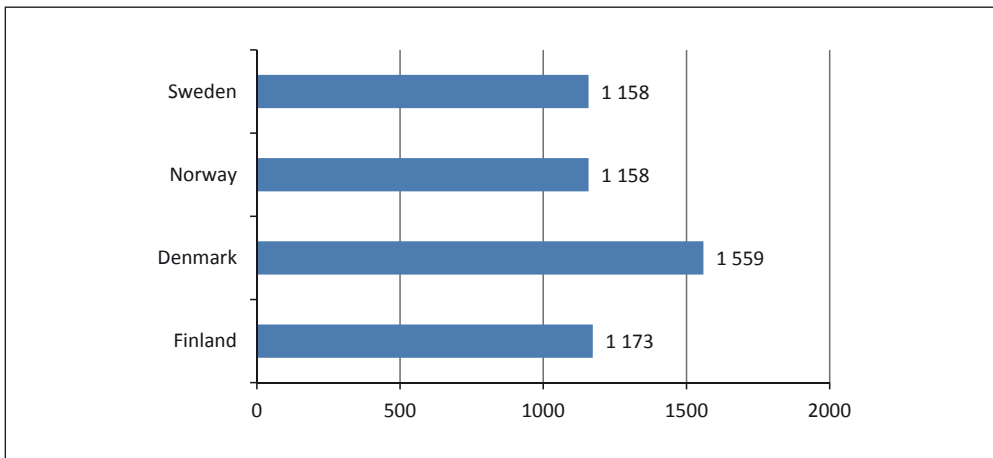


Figure 8. Accidents at work in 2007, occupational sector agriculture, hunting and forestry. Incidence rate with more than three days' absence per 100 000 persons employed (Eurostat, 2012).

Injuries inflicted by farm animals are usually the first or second most common type of farm injury in different countries (Langley & Morrow, 2010). Work with

cattle is a work environment where the behaviour of the animals may be impossible to anticipate. The development of dairy barns from traditional tie stall

barns to loose housing units reduces the human–cattle interactions on cattle farms (Raussi, 2003). In loose housing units the stockperson conducts her/his tasks among free-moving animals. The animals are no longer in close contact with humans. Therefore, it is possible for the animals to become fearful of stockpersons (Raussi, 2003). The animal's fear possibly elevates stress, and this type of situation is dangerous for the stockperson (Grandin, 1999). Cattle may panic, kick or even attack when they are trying to evade the stockperson.

In 2011, the largest share (43%) of all farm injuries in Finland occurred during cattle tending work (Farmers' Social Insurance Institution, 2012). An even clearer majority (76%) of injuries to female farm entrepreneurs happened during cattle tending work. Among men the corresponding proportion was lower, only 33% (Tilastokeskus, 2011). Virtanen et al. (2003) also reported that the majority of injuries to women were related to farm animals. In a survey conducted in 2004 (N = 271 female respondents), 61% of females reported that the dangers in their work were related to farm animals, while the corresponding percentage among male respondents was 22% (Mäittälä & Louhelainen, 2006). Rautiainen et al. (2005a) concluded that men have a higher risk of injury, and that occupational diseases are clearly more common among women on Finnish farms. In addition, most occupational disease cases were caused by animal husbandry exposures. None of these studies accounted for exposures. The studies by Virtanen et al. (2003), Rautiainen et al. (2005a), Tilastokeskus (2011) and the Farmers' Social Insurance Institution (2012) were based on insurance statistics and a study by Mäittälä & Louhelainen (2006) was based on telephone survey. It must be noted that the official statistics only include compensated injuries that induce at least four days of doctor-assigned

absence from work. The total number of injuries is unknown (Rautiainen et al., 2005b). According to survey results among Swedish farmers (N = 5 646), only 8% of all accidents on farms were included in the official statistics for occupational injuries (Pinzke & Lundqvist, 2007). Pinzke & Lundqvist (2007) assessed that modern techniques and equipment have not considerably reduced the frequency of injuries on farms. Long disabilities among Finnish farm entrepreneurs stem from work with large animals, commuting, transporting, grain and feed handling and cutting trees (Rautiainen et al., 2012).

The safety culture approach

The European Agency for Safety and Health at Work (Taylor ed., 2011) underlines how social, organizational culture and human behavioural aspects should be taken into account with a holistic approach if the aim is to improve occupational safety. Feasible methods to study the safety culture should include the whole organization under fieldwork practices, and techniques such as observations and personal interviews should be used. The safety culture approach is assessed to be appropriate especially for small and medium size enterprises, and “particularly for the smaller and micro enterprises” (Taylor ed., 2011). Sørensen et al. (2007) noted how small enterprises have more work environment dangers related to ergonomic, physical and chemical hazards than large enterprises. Also, the quality of safety management is on a higher level in large enterprises than smaller ones (Sørensen et al., 2007).

Reiman & Oedewald (2009) described the recent development of safety science towards a system safety approach where the concept of the organization is more complex than before. The basis of old theoretical approaches to safety includes mechanistic ‘event trees’ and error- or failure-oriented theories. Currently, new theories are being developed and

old approaches challenged (Reiman & Oedewald, 2009). Hollnagel (2007) considers the traditional approaches to analysing safety as engineering views, where human or technological causes, risks and unreliable systems have been studied. The focus has been on forms and structures (Hollnagel, 2007).

Reiman and Oedewald (2008) consider safety as a qualitative and dynamic phenomenon. The basic element of the organizational safety culture is the general management of the organization. Safety culture has several layers such as individual workers' experiences and views, which are part of this culture. Representing another layer, social relationships and processes of the organization are also elements of safety culture. These organizational, psychological and social processes should all be assessed when the aim is to evaluate safety in the organization (Reiman et al., 2008). All members of an organization have an impact on the realization of safety. The method to consider organizations is to examine the whole unity, including different elements such as the technologies used and people (Reiman & Oedewald, 2008).

Since situations and working conditions in reality are constantly changing, Hollnagel (2007) underlined that a new approach to maintaining safety at work is needed. The key element is to control the variability of conditions (Hollnagel, 2006). Organizations, as living and dynamic organisms, must constantly adjust to different situations. Woods (2006) assessed the future trends of organizations in terms of the variability of risks and demands to achieve efficient performance. A safe organization is able to foresee risks and dangerous situations and to adjust the performance according to the current situation (Woods, 2006).

In order to manage uncertainties, Grote (2007) introduced two strategies:

minimizing and coping. Minimizing could be organized, for example, by planning and carrying out procedures. Coping could be organized by adapting to different kinds of situation, by adding freedom and considering disturbances as resources of development. These two strategies may be combined. The feasible strategy is then to motivate workers through work tasks, provide them autonomy, encourage co-operation and allow them to perform flexible changes (Grote, 2007).

Hollnagel (2007) introduced the term 'resilience engineering' where the main task is to adjust functioning according to the constantly changing work environment. A resilient system has the ability to react according to the dangers, and it is also able to monitor the current situation. In addition, a resilient system is able to foresee different kinds of pressures and faults. The three elements of a resilient system (Hollnagel & Woods, 2006) are "knowing what to expect (anticipation)", "knowing what to look for (attention)" and "knowing what to do (rational response)".

Within this study, occupational safety during animal handling work (article III) was considered with a holistic approach by using work observation and semi-structured personal interviews as research material.

2.3 Women's working conditions on farms

As recently as in 1970, the biggest working sector among all Finnish women was agricultural and horticultural professions (Julkunen, 2010). During the past decades, the number of agricultural workers has been decreasing within the EU-27 countries (Eurostat, 2010), and the sector has become male dominated (Schneider et al., 2011). Within the EU-25 countries, in 2005 agriculture employed 5.2% of males and 3.8% of females in work (Eurostat, 2008). Globally, the situation is diverse,

as in 2008 the proportion of females employed in agriculture was 37.1% and that of males 33.1% (FAO, 2010).

In 2007 there were a total of 48 900 women working on Finnish farms, and the majority of them (57%) worked officially as farmers' spouses (Figure 1) (Tike, 2011). Other women working on Finnish farms were classified as main farmers or partners of farm corporations (19%), other family members (18%) and employed workers (6%) (Figure 1) (Tike, 2011).

Gender may be assessed as an insignificant factor related to working life. Taking the gender aspect into account may be considered as a negative feature or somehow undesirable (Korvajärvi, 2010; Julkunen, 2010). Despite this, occupational segregation is a crucial character of Finnish working life. There are traditionally female and male professions and work tasks (Korvajärvi, 2010). Furthermore, according to Eurostat (2008), the concentration of the work sectors of men and women is an increasing trend within the EU-25 countries, and this phenomenon especially pertains to women's employment: six working sectors employ 61% of women in work within the EU-25 countries. The division of working sectors and work tasks according to gender may allow women their 'own field' to operate, but work segregation is generally assessed as a negative feature, because women's tasks are not so appreciated as those of men (Korvajärvi, 2010; Schneider ed., 2011). A special character of women's work is their often multiple roles; in addition to work duties, women tend to be more responsible, for instance, for household tasks and childcare (Schneider ed., 2011).

The basic problem related to women working on farms is the many health and safety exposures (Eurostat, 2010) that their working conditions may include. As nearly half (48%) of farm women work

informally as wives or partners (Euroopan parlamentti, 2003), the health and safety legislation and support nets may not cover them (Schneider ed., 2011).

The Finnish legislation includes a law about occupational safety, which however focuses on employed workers (Suomen säädöskokoelma, 2002). The farmers' occupational health service is a voluntary system which covers 40% of insured farmers (Farmers' Social Insurance Institution, 2010).

Rowe & Hong (2000) have studied the role of wives in family businesses. Overall, cultural aspects and social positions make women invisible in relation to family businesses and their contribution is often unrecognized. Women's roles in family enterprises are often described with the term 'hidden' (Howorth et al., 2010). However, women's role has been assessed as essential to the enterprise and family (Marshack, 1994). Marshack (1994) considered how entrepreneur couples choose "traditional models of masculinity and femininity". It has been noted (Rowe & Hong, 2000) how women may underestimate their contribution and accept minor recognition. Women working as spouses within family businesses earn low salaries, and household work is not included in economic production.

According to statistics from the EU-27 countries, work-related health problems during the preceding 12 months were more frequent among women working within agriculture, hunting and forestry (14% of women) compared to other working sectors (Eurostat, 2010). Among all workers in agriculture, hunting and forestry, the most serious work-related health problem was musculoskeletal problems (Eurostat, 2010). Schneider ed. (2011) described the situation within the European Union; the occupational hazards of women's farm work include high exposure to material, physical and ergonomic dangers

in addition to hazards of intimidation and discrimination. All these references report the agriculture and forestry sector (AFS) as being a sector with several health risks for women. Despite these presented conclusions, circumstances may vary considerably within different European Union countries, and also within different parts of the world. Epidemiologists Merchant and Reynolds (2008) described the assessment of farm working environments as “a substantial challenge”, because the working environments are so diverse and complex. Furthermore, family members and seasonal workers may be involved in farm work, but they are not always included in the agricultural work force. During recent years the increasing use of technology has led to increased farm size; it is possible that exposures have been intensified because workers spend more time doing fewer tasks (Merchant & Reynolds, 2008). Rural populations may have limited possibilities to access health care because of long distances.

A recent survey among Finnish women entrepreneurs (N = 1 239) revealed information about women working within the agriculture and forestry sector [AFS] (Palmgren et al., 2010). The majority (61%) of women working within AFS considered their work to be physically strenuous, and this share was greater than among other professional sectors. In addition, 72% of AFS women considered their work tasks to include manual carrying, heaving and holding up phases, which was the largest percentage among entrepreneurship sectors. Over half of women entrepreneurs working within AFS reported the same types of repetitive work movements (68%), a dusty work environment (64%) and difficult working positions (56%). Respondents from the AFS had experienced unequal treatment relating to their gender. Over one-third (35%) of women entrepreneurs in the AFS assessed themselves to be often or very often overstrained or overemployed

because of the situation within the enterprise (Palmgren et al., 2010).

Elements of work and family life, the farm and home, fellow worker and spouse, as well as professional life and leisure may be mixed on farms (Elger et al., 1995; Silvasti, 2001). Everyday situations faced by farm women have been described as comprising many and partly overlapping tasks and responsibilities (Carruth & Logan, 2002; Heather et al., 2005). Role conflicts have been identified as a stressing element among farm women (Keating, 1987), and their many responsibilities as an element increasing depressive symptoms (Carruth & Logan, 2002). In addition, the physical workload has been assessed as a health risk for women on dairy (Ahonen et al., 1990) and pig farms (Stål & Englund, 2005). On average, women usually have a lower capacity to cope with physical work than men (Engberg, 1993; Taskinen et al., 1999; McCoy et al., 2002).

There are currently insufficient representative studies informing about women's work profile on farms. A survey among farm women in Southwest Finland (N = 143) reported how women were involved in various tasks on farms, including fieldwork, book-keeping, payment transactions, animal husbandry and forest work (Karppinen, 2005). A study on small-scale family farms (N = 100) by Sireni (2000) reported how farming couples worked together in the barn, men worked in the fields and forest and maintained machinery, and women took care of childcare and household work. In addition, women performed tasks using computers such as accounting and administrative work and used information technology in cattle barns (Sireni, 2000; Karttunen, 2003; Yli-Uotila, 2003).

Recent research results (Fenton et al., 2010) have revealed how women are interested in agricultural themes such as sustainable and organic farming. Vainio

et al. (2007) described how female farm entrepreneurs consider animal welfare a more important issue than their male counterparts. These themes are also highlighted by consumers as qualitative, essential and important aspects of agriculture (Broom, 2010; Kerney, 2010). Studies on future trends note that these issues are strengthening (Ahokas & Aakula, 2010). It may therefore be considered that losing women's contribution to agriculture would not be a favourable development in the future.

2.4 Summary of the literature

This literature review (Chapter 2) has revealed that well-being is a broad, complex concept and that no widely accepted definition is currently available. A framework by Danna and Griffin (1999) presents two main elements of well-being in the workplace: a) satisfaction related to work and life and b) the state of mental and physical health. An important basic assumption of well-being is the role of individual characteristics; under similar working conditions, the experiences of different workers may vary considerably.

Stress is often described as a situation where the demands of work are greater than worker is able to cope with. A holistic definition of stress incorporating different scientific aspects is lacking. During recent years, several theoretical approaches to stress have been developed. Stress models include two basic processes: a) the type of evaluation and response a person experiences under particular environmental circumstances and b) time as an element, including short- and longer-term interaction between people and the environment.

The most frequently mentioned stress symptoms are: a) physical symptoms, including cardiac symptoms, headache, high blood pressure, upset stomach and

an elevated cholesterol level; b) emotional symptoms, such as depressed mood, apathy, job dissatisfaction, anger, anxiety and despair; c) thinking symptoms, including forgetfulness, poor judgement or decisions and poor concentration or reduced accuracy; and d) behavioural symptoms, such as sleeping problems, short temper, social conflicts, withdrawal or alienation, aggression, alcohol abuse, lack of commitment to the organization, poor performance and occurrence of accidents.

Agriculture is still among the most dangerous occupations. In 2011, nearly half (43%) of all farm injuries (at least 4 days absence from work) in Finland occurred during cattle tending work, and among females the corresponding figure was 76%. The ongoing process of change in cattle barns from tie stall barns to loose housing barns may reduce the interaction between the animals and people. A frightened animal is dangerous and its behaviour may be difficult to predict. When occupational safety is managed and studied, a safety culture approach should be followed that considers the whole organization, including social, organizational, technological, cultural and behavioural aspects with a holistic approach.

One-third (34%) of all farm entrepreneurs in Finland are female. Most women (57%) working on farms are officially categorized as farmers' spouses. Work tasks on the farm include many health and safety exposures. The contribution of women to agriculture should not be lost, because women emphasize themes such as sustainable, organic farming and animal welfare. Consumers also value these same themes when they assess the quality of foodstuffs. In addition, these themes are expected to strengthen in future.

During recent decades, agricultural production has faced considerable changes

along with the ongoing restructuring of agriculture. Discussion of farmers' well-being at work and coping ability has increased. Therefore, more detailed information on these issues is needed. Recent changes in the operational environment related to agriculture have obviously had an effect on the working conditions of women on farms. Safety

promotion with a holistic approach is necessary within agriculture, which is a particularly injury risky occupational sector and based on small-scale enterprises. Women's contribution within agriculture is still often poorly recognized, and research focusing on women is needed to characterise the present situation and suggest improvements.

3 Aims

The general aim of this study was to examine well-being at work among Finnish farm entrepreneurs. This aim was divided into more specific research questions as follows:

1. Based on the prevalence of stress and mental symptoms, what kind of picture do these results give about stress among Finnish full-time farm entrepreneurs? I, II, V
2. What types of factors are associated with stress and strain among farm entrepreneurs? I, II, V
3. Animal tending is a work phase on farms with an especially high injury risk. As an

element of the stockperson's well-being at work, how can we increase occupational safety during animal handling? III

4. Based on the working conditions of dairy farm women during the current agricultural restructuring, what factors are the negative and positive elements of women's well-being at work on dairy farms? IV

Research questions 1 and 2 concern the quantitative articles I and II. Research questions 3 and 4 concern the qualitative articles III and IV. Article V is a literature review and partly based on article I of the dissertation thesis.

4 Materials and methods

4.1 Study design

The main theme, well-being at work on farms, was researched using two main approaches: a quantitative survey (I, II, also V) and qualitative research on ten dairy farms (III, IV) (Figure 2). The structure of the thesis is described in Figure 9. The quantitative telephone survey (I, II, also V) consisted of responses from 1 182 full-time farm entrepreneurs in Finland in a cross-sectional study. The qualitative research material (III, IV) included work observations, semi-structured interviews, photographs and notes concerning ten farm women working on dairy farms. The approaches provided different types of information on well-being at work on farms, as the survey results (I, II, also V) represented information on feelings and symptoms of stress among Finnish farm entrepreneurs (N = 1 182). In addition, the qualitative research (III, IV) provided a holistic, ‘bottom-up’ view (Willig, 2008), with research information on occupational safety among cattle handlers and farm women’s working conditions on farms. The original articles (I, II, III and IV) are complemented by a literature review (V) concerning stress among farm entrepreneurs, which was partly based on the first article (I).

Subject confidentiality and informed consent were taken into account during the telephone survey (I, II) and qualitative studies (III, IV). At the beginning of the telephone interview (I, II) the respondents were informed that the answers would be handled confidentially and that taking part in the survey was voluntary. In addition, the respondents were told that the identity of the individual respondents would not be revealed in any phase of processing of the sample or results. During the farm

visits (III, IV) of the qualitative study, a written confidentiality agreement on the later use of the research material was signed by each respondent and by the researcher. The agreement included the following statements: The research material is used confidentially. The research material is reported so that the identity of the respondent or of the farm at issue are not revealed. Therefore each respondent will be reported with a pseudonym. Any text from which it might be possible to identify the respondent is removed from the report. If photographs taken on a farm are used later in public, permission must first be obtained from the respondent.

4.2 The telephone survey

Data collection I, II, also V

The Finnish Institute of Occupational Health carried out a research study entitled “Occupational Health and Agriculture in Finland 2004” [Farm2004] during 2004–2006. The same type of follow-up study had previously been conducted four times: in 1979 (Vohlonen et al., 1982), 1982 (Vohlonen et al., 1985), 1986 (Notkola et al., 1990) and 1992 (Susitaival ed., 1994) [Farm1992].

The original aim of the telephone survey Farm2004 was to register current knowledge about working conditions and health risks within the agricultural sector in Finland. The second aim of this surveillance study was to compare the mental symptoms among farm entrepreneurs to those within the general Finnish working population and to the situation of an earlier follow-up study conducted in 1992 (Rissanen ed., 2006). Other aims were to describe the state of health, work ability, chronic diseases and injuries among

farm entrepreneurs. The last aim was to determine how occupational health care meets the expectations of respondents (Rissanen ed., 2006). In articles I and II, the question about stress (I) and mental symptoms (II) are further analyzed and the research material represents a selected data from robust surveillance studies conducted in 2004 and 1992 [Farm2004 and Farm1992] as described above. The first author of articles I and II did not collect the data or construct the questions, but the writer team of these articles included persons who were involved in planning, leading and conducting this telephone survey.

Research data were gathered using computer assisted telephone interviews conducted by the CATI (computer assisted telephone interview) unit in Kuopio, Eastern Finland (Taattola et al., 2012). The CATI unit in Kuopio and the Finnish Institute of Occupational Health (FIOH) have significant experience in the conducting of interviews, enabling them to achieve high quality in collecting research material in co-operation with the researchers (Taattola et al., 2012).

The first phase of sampling involved a random sample of Finnish farms (N = 6 000) from the farm register of the Ministry of Agriculture and Forestry in 2004 (totally 71 054 farms in 2004). From this sample, 5 127 active farms were accepted and an information letter was sent to these farms. Criteria for excluding farms (N = 873) were that they had ceased agricultural production, the farmer had died or moved from farm, the farmer was under 18 or over 65 years old, there was no information about the main farmer (for instance, the farm was a limited company or public farm, such as an educational or research farm), the farmer spoke Swedish or the farm did not carry out agricultural production. In 2004 farmers retired at the age of 65, and this age was therefore chosen as the upper age limit of respondents.

The sample (N = 5 127) was interviewed in order of sampling until at least 1 000 farmers had been interviewed. Power analysis indicated that at least 1 000 farmers should be included in order to obtain a representative sample of Finnish farm entrepreneurs. About three days after the posted letter, an attempt was made to contact 2 471 farms by telephone. The outcome of these telephone calls was that 266 (10.8%) persons refused to participate, in 64 (2.6%) cases the farmer could not be reached and for 23 (0.9%) cases the telephone numbers were not available. Altogether, 2 118 (85.7%) farms were interviewed by telephone. The participation rate was 85.7%. Among the respondents, 1 182 were full-time farmers, including 911 (77.1%) men and 271 (22.9%) women. The rest of the respondents were part-time farmers (N = 830) and other persons living on the farm (N = 106). At the beginning of the interview the respondents were informed that taking part in the survey is very important. In addition they were encouraged to participate by explaining that their answers provide valuable information about working conditions and well-being among rural citizens. The characteristics of respondents who refused to participate in the survey were not examined.

No information was available beforehand on which of the 2 471 contacted persons were full-time farmers, part-time farmers or other persons living on the farm. Thus, the interviewer asked about this issue at the beginning of the interview and selected the subsequent questions based on this information. A full-time farmer was defined within this research project as a person whose main work was in agriculture or forestry during at least four months of the year. The earlier follow-up survey of 1992 [Farm1992] defined a full-time farmer as a person who performed mainly agricultural work or received his or her

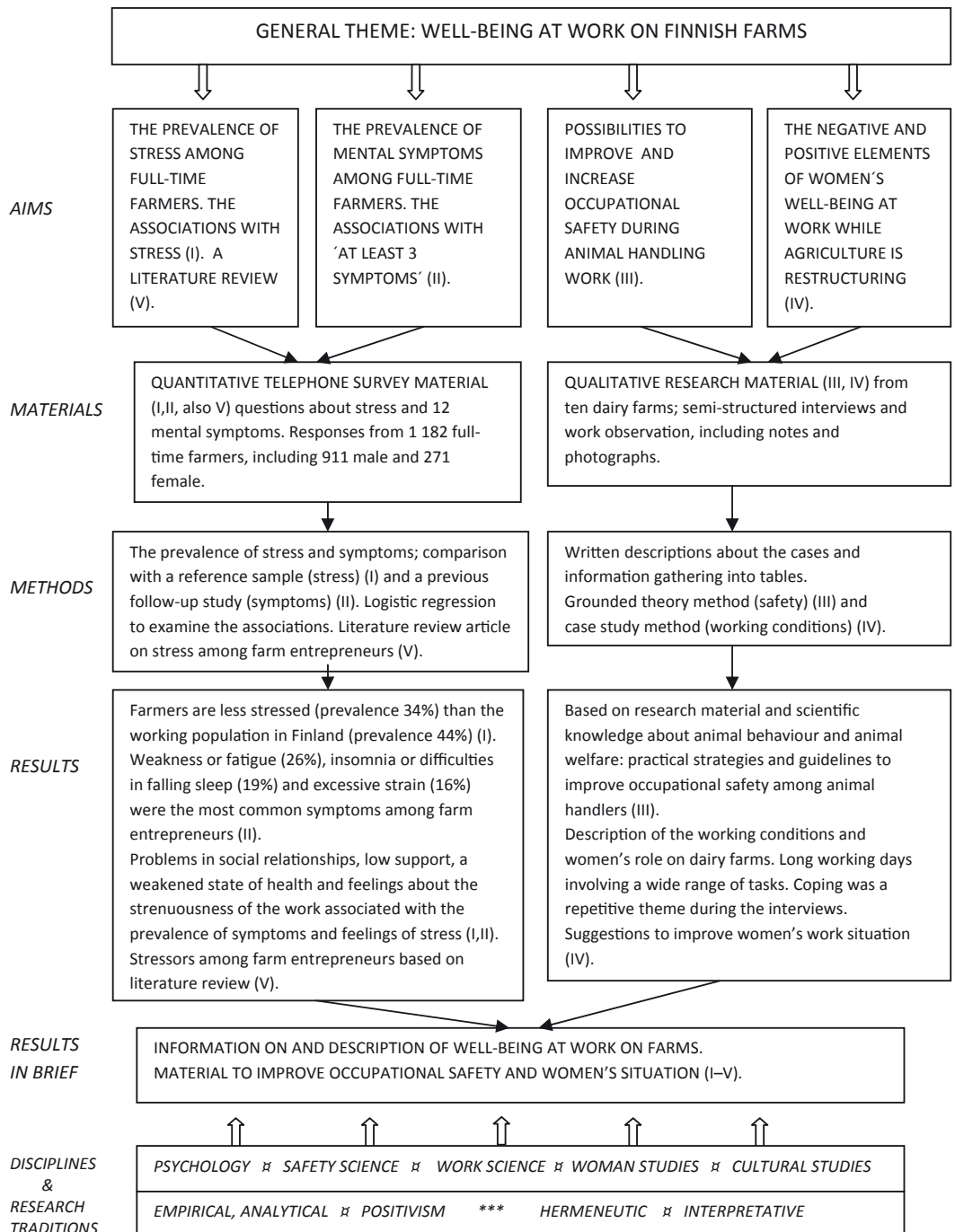


Figure 9. The structure of the dissertation thesis.

main income from agriculture (Susitaival et al., 1994). The definition of a full-time farmer which was in use in 2004 was not a standard definition in Finland. Finnish legislation defines a farm entrepreneur as a person or family member or a non-married partner, who her/himself takes part in agricultural work on a farm; a farm may also be a limited company or similar corporation and the size of a farm is at least five hectares of farmed land (Finlex, 2006).

The regional distribution of study farms in the sample was representative of Finnish farms in general in 2004. However, differences were also observed, mainly because only full-time farmers were included in this study sample. The study farms were slightly larger (field area 44 ha, forest area 67 ha and 21 cows/farm) than in general on Finnish farms in 2004 (field

area 32 ha, forest area 46 ha, 18 cows/farm) (Table 5) (Pihamaa, 2005; Tike, 2006a; Tike 2006b). The farmers were also slightly younger in the sample (47 years) than in general on Finnish farms (49 years). Moreover, the numbers of younger and older female respondents in the sample were lower than in general on Finnish farms. The number of dairy farm respondents was higher in the Farm2004 sample (42%) than on average among all Finnish farms (24%) in 2004, whereas the number of crop farming respondents was lower in the sample (26%) than on average among all Finnish farms (58%) in 2004 (Table 5) (Pihamaa, 2005; Tike, 2006a; Tike 2006b).

The questions asked in the telephone survey were adjusted by software several times during the interview according to

Table 5. Comparison of the characteristics of farmers in the 2004 study sample and in general on Finnish farms in 1992 and 2004 (Pihamaa, 2005; Tike, 2006a; Tike 2006b).

Characteristics	In general in 2004		Sample FARM2004		In general in 1992	
	Number	%	Number	%	Number	%
Female, N, (proportion)	33 230	(35.9%)	271	(22.9%)	68 675	(41.4%)
Male, N, (proportion)	59 339	(64.1%)	911	(77.1%)	97 345	(58.6%)
Number of farmers	92 569		1 182		166 020	
Age (years), on average	48.9		46.9		43.3	
Number of farms	72 054		1 182		121 349	
Average field area, hectares	31.5		44.0		18.1	
Cows / dairy farm	18		21		11	
Production sector	Number	%	Number	%	Number	%
Dairy	17 490	24	491	42	37 874	31
Other bovine cattle	4 774	7	85	7	11 872	10
Piggery	3 401	5	98	8	6 899	6
Poultry	1 034	1	54	5	2 625	2
Crop farming	41 737	58	308	26	47 265	39
Other ¹	3 618	5	105	9	14 814	12
Forestry	-	-	41	3	-	-
Total	72 054	100	1 182	100	121 349	100

¹Since 1995, only those forestry farms that also have fields in agricultural production have been considered as active farms.

previous answers and the circumstances and equipment of the farm in question. Therefore the number of asked questions varied between different interviews. All interviews included background questions. Questions about pesticide use, health, work, mental well-being, working conditions and occupational health services were only asked of full-time farmers. For full-time farmers, the survey included at a maximum the following numbers of questions:

- background questions (maximum 59),
- production sector specific questions (maximum 9),
- working conditions (maximum 74),
- well-being and way of life (maximum 55), including questions about stress (number t12) and symptoms (questions t13 and t13b),
- questions about economical situation and changes in life (3 questions),
- attitudes (2 questions),
- social support (maximum 13 questions),
- injuries (maximum 24),
- occupational health care (maximum 36) and
- influences of EU membership (6 questions).

Taattola et al. (2012) described the questionnaire comprising 704 variables if sub-questions are included. The time for completion of the interview varied from about one hour for full-time farm entrepreneurs to ten minutes for part time farm entrepreneurs or family members. The questions about stress and symptoms were asked in the middle of the interview as part of the questions about well-being.

A somewhat similar question about stress (Elo et al., 2003) has been used in several studies in Finland (e.g. Pråhl-Ollila, 1995; 1997, Piirainen et al., 1997, Perkiö-Mäkelä et al. 2006a; Palmgren et al., 2010; Perkiö-Mäkelä et al., 2010). In this question, the interviewer first defines stress to the respondent and then asks about feelings

of stress. The question is the following (Elo et al., 2003): “*Stress means a situation in which a person feels tense, restless, nervous or anxious or is unable to sleep at night because his/her mind is troubled all the time. Do you feel this kind of stress these days?*” The alternatives to answer were; not at all (1), only little (2), some (3), quite a lot (4), a great deal (5), I am not able to answer (6), no answer (7). Later during the logistic regression analysis the answers were used as dichotomous as follows; some, quite a lot or a great deal were interpreted as experiencing stress and not at all, only little were interpreted as no stress. As described earlier, eustress is a positive phenomenon (Donham & Thelin, 2006) as it stimulates motivation, growth, development and better human performance (Rout & Rout, 2002). The symptoms mentioned in the questions about stress (Elo et al., 2003); tenseness, restlessness, nervousness, anxiousness and sleeping problems may be assessed as negative outcomes of stress and therefore also ‘some’ stress was interpreted as experiencing stress.

Symptoms included in this question have been presented earlier (Chapter 2.1 Stress) in Tables 1–4 listing different stress symptoms and the corresponding reference sources. If the symptoms included in Tables 1–4 are compared with the definition of stress in the question (Elo et al., 2003), the following similarities are observable. Among the stress symptoms mentioned are ‘excitement’ (Jones et al., 1994; Mattila 2010), ‘anxiety or restless’ (Jones & DuBois, 1987; Jones et al., 1994; Mattila 2010), ‘short temper, irritation, nervousness or tenseness, lack of self-control’ (Cooper & Marshall, 1976; Jones & DuBois, 1987; Kahn & Byosiere, 1992; NIOSH, 1999; Mattila, 2010; Ahola & Lindholm, 2012), ‘despair, helplessness’ referring to a similar feeling to being anxious (Kahn & Byosiere, 1992; Jones et al., 1994; Ahola & Lindholm, 2012), and ‘disturbed sleep, unable to sleep or insomnia’ (Jones & DuBois, 1987; Jones

et al., 1994; NIOSH, 1999; Mattila, 2010; Ahola & Lindholm 2012; Anxiety Disorders Association of America, 2012).

Mental symptoms were measured using a questionnaire developed by Raitasalo (1992). The questions about mental symptoms were the same in the Farm1992 and Farm2004 samples (Table 6). In both surveys, the interviewees asked questions about the following 12 symptoms. Corresponding reference sources from Tables 1–4 are also presented:

a) *Headache* (Jones et al., 1994; NIOSH, 1999; Mattila, 2010; Anxiety Disorders Association of America, 2012);

b) *Weakening of memory* (symptoms ‘forgetfulness or reduced working memory’; Jones et al., 1994; Sonnentag & Frese, 2003; Mattila 2010; Ahola & Lindholm, 2012) or *ability to concentrate* (symptoms ‘poor concentration or reduced accuracy’; Jones et al., 1994; NIOSH, 1999; Sonnentag & Frese, 2003; Ahola & Lindholm, 2012);

c) *Nervousness or strain* (symptoms ‘short temper, irritation, nervousness or tension, lack of self-control’; Cooper & Marshall, 1976; Jones & DuBois, 1987; Kahn & Byosiére, 1992; NIOSH, 1999; Mattila, 2010; Ahola & Lindholm, 2012);

d) *Depression or melancholy* (symptom ‘depression or depressed mood’; Cooper & Marshall, 1976; Jones & DuBois, 1987; Kahn & Byosiére, 1992; Jones et al., 1994; Sonnentag & Frese, 2003; Mattila 2010);

e) *Weakness* (symptom ‘exhaustion’; Jones et al., 1994) or *fatigue* (Jones & DuBois, 1987; Kahn & Byosiére, 1992);

f) *Insomnia or difficulties in falling asleep* (symptoms ‘sleep disturbances, unable to sleep or insomnia’; Jones & DuBois, 1987; Jones et al., 1994; NIOSH, 1999; Mattila,

2010; Ahola & Lindholm, 2012; Anxiety Disorders Association of America, 2012);

g) *Irritability or bad-temperedness* (symptoms ‘short temper, irritation, nervousness or tension, lack of self-control’; Cooper & Marshall, 1976; Jones & DuBois, 1987; Kahn & Byosiére, 1992; NIOSH, 1999; Mattila, 2010; Ahola & Lindholm, 2012);

h) *Tension when meeting strange persons* (symptoms ‘withdrawal or alienation’; Kahn & Byosiére, 1992; Jones et al., 1994; Mattila, 2010; Ahola & Lindholm, 2012)

i) *Feeling of fear* (Jones et al., 1994);

j) *Dizziness* (Jones et al., 1994; Mattila, 2010), *trembling or palpitation* (symptoms ‘palpitations, cardiac activity, elevated heart rate or health breakdowns (cardiovascular, etc.)’; Cooper & Marshall, 1976; Jones & DuBois, 1987; Kahn & Byosiére, 1992; Jones et al., 1994; Sonnentag & Frese, 2003; Mattila 2010; Anxiety Disorders Association of America, 2012);

k) *Overstrained or a feeling that everything is overwhelming* (symptom ‘exhaustion’; Jones et al., 1994);

l) *Lack of initiative or indecisiveness* (symptoms ‘apathy, hopelessness, lack of vigour, frustration or reduced aspiration’; Cooper & Marshall, 1976; Jones & DuBois, 1987; Kahn & Byosiére, 1992; Jones et al., 1994; Ahola & Lindholm, 2012, and ‘poor judgement or decisions’; Jones & DuBois, 1987; Jones et al., 1994; Mattila, 2010; Ahola & Lindholm, 2012).

One symptom was asked at a time, for example:

“Have you had during the previous month as long-lasting weakness or fatigue?” The alternative answers were: a) Yes/positive answer, b) I am not able to answer and c) No/negative answer. Different surveys,

Table 6. Surveys, questions included in analyses, scoring of answers and comparisons between samples (I, II).

Survey, respondents, (N)	Article I Subject, compared samples	Scoring	Article II Subject, compared samples	Scoring
Farm2004; full-time farm entrepreneurs (N = 1 182)	Stress ¹	Likert ² 1-5	12 symptoms ³	Dichotomy ⁴
Farm1992; full-time farm entrepreneurs (N = 928)	-	-	12 symptoms ³	Dichotomy ⁴
Work2003, working people in Finland (N = 2 335)	Stress ¹	Likert ² 1-5	-	-

¹ Question about stress: "Stress means a situation in which a person feels tense, restless, nervous or anxious or is unable to sleep at night because his/her mind is troubled all the time. Do you feel this kind of stress these days?"

² Five alternatives; 1= not at all to 5 = a great deal. Later during the logistic regression analysis the answers were used as dichotomy as follows; some, quite a lot or a great deal were interpreted as experiencing stress and not at all and only little were interpreted as no stress.

³ Example question about a symptom: "Have you had during the previous month as long-lasting weakness or fatigue?"

⁴ Alternatives to answer were a) Yes / positive answer, b) I am not able to answer, c) No / negative answer.

questions included in analyses, scoring and comparisons (I, II) are presented in Table 6.

The reference sample for the prevalence of stress (I) comprised a sample of the Finnish working population in 2003 [Work2003] (Table 6), with 3 331 respondents comprised of Finnish-speaking 25- to 64-year-old persons, representing all professional branches. This survey sample was gathered in the follow-up study "Work and health in Finland", which has been carried out every third year since 1997 by the Finnish Institute of Occupational Health (Piiirainen et al., 2003). The aim was to gather information on the working conditions, health, working ability and well-being among Finnish working people. The participation rate in 2003 was 67%, and this sample is representative of working Finnish citizens at the time (Piiirainen et al., 2003).

The reference sample for the 12 symptoms of stress (II) was a cross-sectional study entitled "Farming and Occupational Health in Finland in 1992" [Farm1992] (Susitaival

ed., 1994) (Table 6), which comprised 928 respondents, including 58.9% (N = 547) male and 41.1% (N = 381) female respondents. The respondents were gathered for the fourth time from the same 14 Finnish municipalities since the first follow-up study in 1979. Within these 14 municipalities, 8 200 farmers were working in 1992. The study population of 6 530 farm entrepreneurs consisted of 4 614 "old farmers" who participated in the 1979 survey and 1 916 "new farmers" who agreed to take part in the study in 1992. Those members who had ceased agricultural production, moved or died were removed (N = 775) from the sample. From the study population, a sample of 5 000 farmers standardized by age and gender was selected. The aim was to obtain a sample with the same age distribution as among all insured farm entrepreneurs in 1990. Within this sample, the number of part-time farmers was 974, no telephone number was available for 495 farmers, 157 could not be contacted by telephone and 139 respondents refused to participate. Altogether, 3 237 full-time farmers were interviewed within this survey, but mental

symptoms were examined among part of the sample that included 928 respondents. Within this Farm1992 sample, the average age was 42.1 years among male respondents and 42.5 years among female respondents. The most common production sector was dairy (52% of male respondents and 56% of female respondents) and crop farming (20% of male respondents and 16% of female respondents). Sample Farm1992 is not included in Table 5, because not all listed characteristics were available for the sample.

Data analysis (I, II)

Survey results on the prevalence of stress and mental symptoms were analysed first by examining the prevalence, secondly by conducting comparisons with the reference samples, and the third phase consisted of binary logistic regression analysis to indicate the associations with the background variables. The z-test was used to statistically compare the Farm2004 and reference samples Work2003 and Farm1992 with regard to the prevalence of stress and symptoms. In these analyses, age and gender were standardized and the significance level was $p < 0.05$. Binary logistic regression analysis included the response variables as binary variables: stress (1 = stress, 0 = no stress) and 'at least 3 symptoms' (1 = at least 3 symptoms, 0 = only 2, less symptoms or no symptoms). The SAS/LOGISTIC procedure was used to fit the model. The predictor variables were chosen according to the previous research literature, including:

a) variables used in a previous follow-up study, Farm1992 (Simola et al., 1994), classified as demographic, work and production variables, health and working ability, health behaviour, changes in life and attitude variables, and

b) variables used in an earlier study (Leskinen, 2004) related to work, family, life circumstances, support outside the

family and attitude towards the European Union.

In addition, some variables were included because they had been found relevant in earlier research:

* years as an agricultural entrepreneur (Stallones et al., 1995; Carruth & Logan, 2002),

* changes in life during the previous year (Stallones et al., 1995; Scarth et al., 2000),

* the number of days of pesticide usage during the previous growing period (Carruth & Logan, 2002; Stallones & Beseler, 2002) and

* the number of sick leave days during the previous 6 months (Melberg, 2003).

The levels of the predictor variables were reclassified when the number of cases in one of the levels was too small, because in this situation the model may become unstable or might not run at all. Predictor variables with interrelated correlations were removed from the model to avoid the multicollinearity problem. Variables were dropped from the model if they did not significantly affect the response variables. Un-adjusted and adjusted odds ratios (OR) and 95% confidence intervals were calculated for each variable. The confidence intervals were related to the P-values such that the odds ratio (OR) would not be statistically significant if the confidence interval contained 1. The odds ratio (OR) describes the strength of the association between the predictor variable and response variable: how much more likely it is, with respect to odds, that a certain event will take place in one group relative to its occurrence in another group.

4.3 The qualitative study

Data collection (III, IV)

During June and July 2007, ten dairy farms were visited in order to observe work practices and interview farm women. The

following criteria were formulated to guide the farm selection:

- a) The farms should have different kind of barns in use: tie stalls (4 farms), loose housing (4) and automatic milking systems (2). The automatic milking system farms should have used the system during at least a year.
- b) The dairy farms should be located in at least two separate counties in Finland.
- c) The farm women should work full-time on the farms, their ages should vary, they should agree to the request to take part in the study and be willing to discuss their work.
- d) The farm visit day should be as normal as possible and during the growing season.

The criteria (a-d) were formulated by the guidance group of the research project in order to reach a sample including different kinds of barn technologies and working environments. The aim was also to get a sample representing farms from a sufficiently wide geographical area.

Two countryside organizations, the cooperative Länsi-Maito and the county office of the Central Union of Agricultural Producers and Forest Owners, provided their expertise and forwarded the contact information for suitable farms. The contacted women were assessed by two organizations as suitable persons for inclusion in the research project and they were provided with information about the study. When the chosen persons were contacted and asked to participate in the research, there were no refusals.

The included farms were from three counties in southern-western Finland, namely Varsinais-Suomi, Satakunta and Pirkanmaa. The farm visit started (between 5.00 a.m. and 1.00 p.m.) by observing first the farm women's work in the cattle

barn. The guidelines of the Association for Animal Disease Prevention in Finland were followed during the visits. During the observation in the barn the researcher followed each woman's work tasks, wrote notes, took photographs (242 in total) and made video recordings. In addition to observation, this time period spent together provided an opportunity to get to know each other and build confidence. The farm women had an opportunity to provide the information they wanted to or which they considered important, and to discuss with the researcher. In some cases, the researcher tried through some small tasks to help with the work duties of the women.

After work observation, a semi-structured interview was carried out at home, usually in the kitchen (Anneli, Kristiina, Mari, Noora and Tuula), in living room (Heli, Riikka, Virpi and Vuokko) or in garden (Satu). The reported names of the respondent are pseudonyms. The interviews on farms were organized to reflect the particular situations on the farms: the woman answered the questions, but other persons also provided some complementary comments. These persons were the husband (for Anneli, Tuula and Virpi), a daughter (Tuula) and an extension worker for dairy entrepreneurs (for Satu and Virpi). On average, the duration of the visits was 5 h 30 min (range 3 h 40 min to 8 h 15 min). The shortest farm visit was with Tuula who had the lowest number of cattle and her style of answering was concise. The longest visit was with Virpi, who had extra work in the barn and she answered the questions with long explanations and reasoning. In general, the time varied according to the situation on the farms, the amount of work with cattle and the amount of discussion.

When the visits started, 32 questions were formulated beforehand for the first visit, and these questions were then asked of all respondents. This kind of method,

using pre-formed questions, proved to be suitable for entrepreneurs; the discussion proceeded, and the interview time was used effectively. The interview included the following topics: the demographic background of the respondent and farm, the distribution of work between family members/workers, the health of the respondent, injuries during farm work, the use of personal protective equipment, work hazards, mental well-being, work satisfaction and changes at work during the previous two years. During the discussions the respondent revealed new issues concerning these topics. Thus, 18 new questions were added during the farm visits to the interview procedure. After the first interview five questions were added. As an example, the first respondent described that she will have a holiday, but that it is uncertain whether it really is a free day without work tasks. During illnesses the farming couple did not organize any help or substitute workers to do the farm work. Therefore, during the following interviews, questions about these issues were asked: “How have your holidays gone during the past year?”, “Was the date of holiday suitable to you?”, “Is it possible to disentangle yourself from your work tasks during holidays?”, “Is it possible in practice to take sick leave?” and “Were you able to organize your farm work duties during holiday or sick leave?”. This type of method for collecting qualitative research material is described by Corbin & Strauss (1990) and Ely (1991).

Partly because of the intensive working period or childcare duties, discussions were interrupted in half the cases (Riikka, Mari, Noora, Satu and Vuokko). All interviews were recorded successfully. After all the farm visits had been carried out, the interviews were transcribed word for word by the researcher. Notes, for instance, about laughing, gaps and whispering were added to the transcripts to indicate how the women reacted and felt during

the interview. Interruptions, background noises and other people’s comments were also included in the transcriptions.

Data analysis (III, IV)

After the interviews had been transcribed, descriptive texts were written based on each woman’s transcribed interviews and other research material (Eisenhardt, 1989). The descriptions also included quotes of interview transcriptions. These texts were posted to each respondent in order to provide a possibility to give feedback and correct mistakes. Two respondents (Kristiina and Tuula) corrected their descriptions. Some example headlines of the descriptions are the following:

Anneli Work in the shadow of illness
Heli Burn out – a threat to farming
Kristiina Fluency of entrepreneurship
Noora Happy farm woman.

In addition, charts (size A4) were established about Anneli’s, Mari’s, Riikka’s, Satu’s and Vuokko’s situation. Developing charts was started already between the farm visits. Publication permission was requested for 93 photographs of farm women’s work. The information was collected in twelve tables in order to formulate the holistic picture, to distinguish differences and similarities in the sample (Eisenhardt, 1989). The tables included information about the following themes:

- * visited dairy farms (field and forest hectares, number of cows and young cattle),
- * respondents (age, farm work experience, preferred professional title, education, how the respondent started to work on a farm),
- * work tasks,
- * the timetable of a normal working day,
- * risks of work,
- * health (own assessment, chronic diseases, do the symptoms harm working, assessment of work ability, the most difficult features in work),

- * injuries (injuries during the past two years on the farm, near misses, injury risks),
- * the use of protective equipment (was any being used by the respondents during the farm visits),
- * well-being (own assessment, prevalence of stress and symptoms),
- * work satisfaction (Table 1: own assessment, desired changes, satisfaction with situation in life and the desired changes; Table 2: own position on the farm, desired improvements and changes during the past two years) and
- * possibilities to be away from work (possibilities to have a vocation and is it possible for the respondent to have a holiday with her husband).

The research data from farm visits were analysed in two phases. First, the research material about safety in animal handling work (III) was analysed according to grounded theory (Figures 10 and 11) (Corbin & Strauss, 1990; Auerbach & Silverstein, 2003) and the action research method (McNiff & Whitehead, 2000).

The process for developing grounded theory is described by Auerbach and Silverstein (2003) as “steps toward

understanding” (Figure 11). The aim was to answer the research question: “As an element of the stockperson’s well-being at work, how can we increase occupational safety during animal handling?” The sample included farms (Tuula, Riikka) where injuries were rare and also farms (Anneli, Mari) where injuries were frequent. After farm visits a basic question emerged; what phenomenon causes the difference in the number of injuries? The used approach is based on the sample including comparisons of observations and suggestions of relationships between observations (Luomanen, 2010). The process started with the research material gathered from farm visits. Then, repeated information and relevant parts about farm injuries, near misses, occupational risks and all information about animal-handler relationships, animal handling skills, methods and experiences were selected from this material. Themes such as differences and similarities in the frequency of injuries, near misses, occupational risks and the different kinds of relationships between the respondents and farm animals were observed. These differences, similarities and variations enabled the establishment of four strategies related to

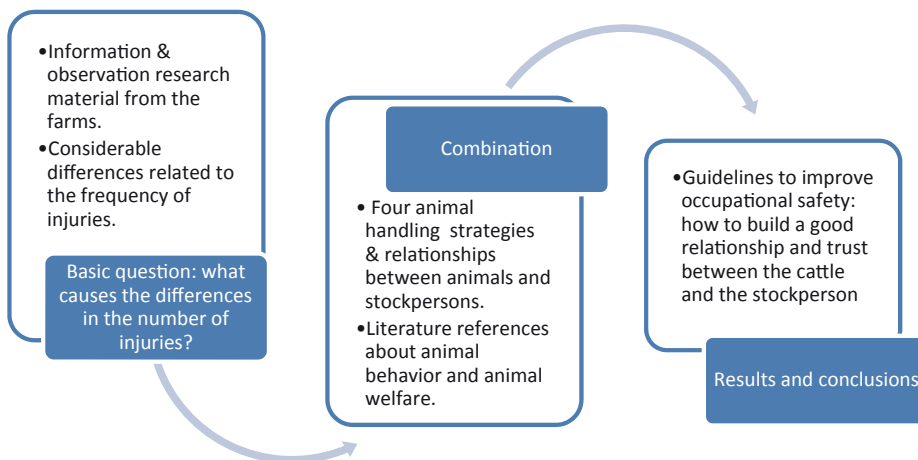


Figure 10. Analysis of the research material with the grounded theory method (III).

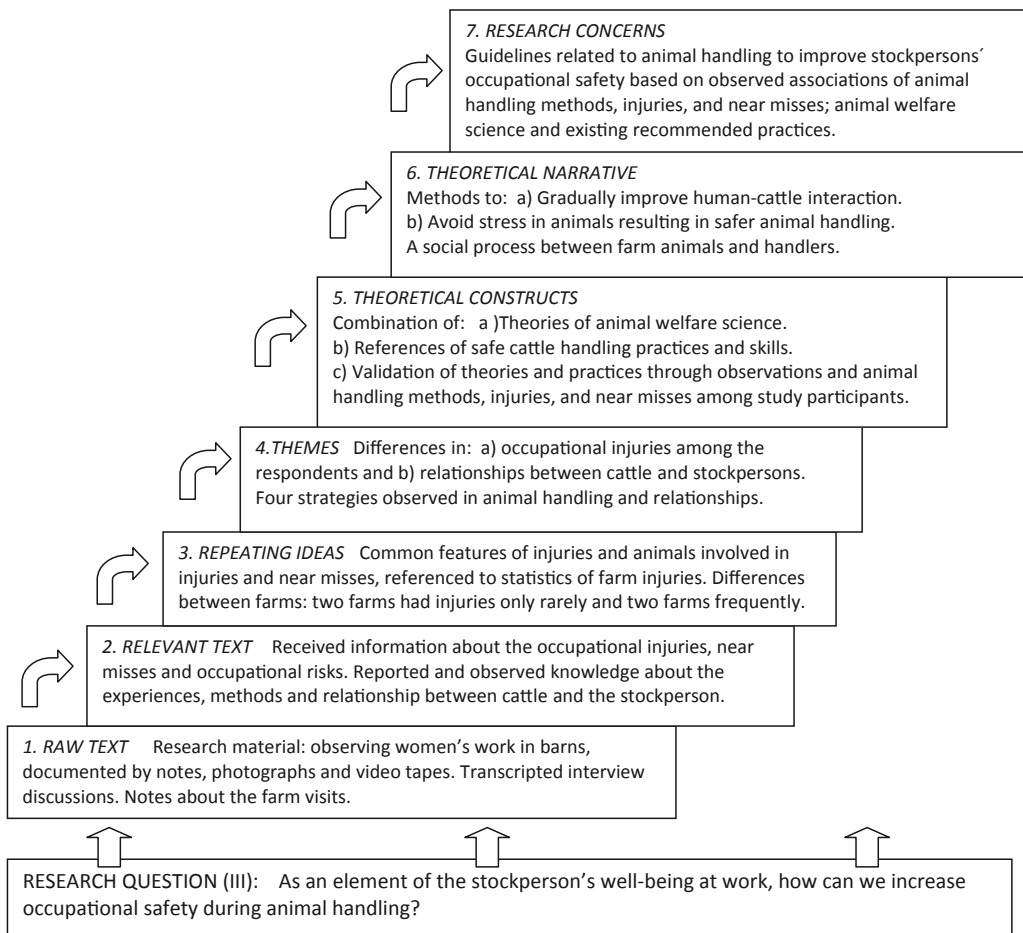


Figure 11. Seven “steps toward understanding” beginning from the bottom: “raw text” to the highest level “research concerns” (Auerbach & Silverstein, 2003) and corresponding phases of the study (III).

animal handling and relationships between animals and stockpersons. The features were combined, questioned and compared (Corbin & Strauss, 1990) with theories of animal welfare science, references concerning safe cattle handling practices and occupational injury statistics. With this information, methods to gradually improve human-cattle interaction and to avoid stress in animals were identified as a social process (Willig, 2008) between farm animals and handlers. As a positive consequence, this process may create a

safer working environment. Guidelines for safer animal work on farms were produced, representing an element of the action research process (McNiff & Whitehead, 2000). The analysis process is described in Figure 11 (III).

The women's work, working conditions and role (IV) were analysed using the case study method (Laine et al., 2007; Willig, 2008; Berry, 2011). The aim was to clarify the present situation on dairy farms related to distribution of work tasks, work conditions

and the position of women farmers. The research question was: “Based on the working conditions of dairy farm women during the agricultural restructuring, what factors are the negative and positive elements of women’s well-being at work on dairy farms?” The case study method was applied with a holistic approach, including the interaction with the environment and context, social relations and the intricacy of working conditions (Willig, 2008; Berry, 2011). Face-to-face discussions within the women’s own living and working environment allowed the respondents to provide more aspects about the complexity of their work environment and real-life situations.

The research project included a literature review, which was written in Finnish about occupational safety among farm women (Kallioniemi, 2008). Writing of this book chapter enhanced understanding of the research subject and provided information about the earlier research results (Ellinger et al., 2005). The selected analytic strategies (Yin, 2009) were a) developing a case description and b) relying on theoretical propositions (Figure 12) presented in earlier research. The findings were compared and discussed in relation to earlier research results, statistics and existing theories (Laine et al., 2007). Some printed documents, such as professional paper writings, poems and mobile phone messages, written by

farm women, were utilized during the research process. Triangulation (Denzin, 1970) in the collection of information comprised different methods, as research material was gathered by interviews, observations, photographs and notes. Researcher triangulation was also in use, as farm visits were conducted by the lead author, but the analyses and writing processes included contributions from other researchers (Denzin, 1970). As the findings were compared with earlier research results, the research method may be described as explanation building (Yin, 2009). The aim was to find out “how” and “why” something happens. Ellinger et al. (2005) described the analyzing process in which first the story of the situation is written (descriptions of the ten cases) and then the elements of the phenomenon are distinguished (the themes related to working conditions of women on dairy farms). Ellinger et al. (2005) considered that it is possible to “deepen understanding and explanations for phenomena” with cross-case analysis. Three themes (IV) were found concerning the working conditions on dairy farms; a) the distribution of work tasks, b) the aspects of working conditions (length of the working day and location of tasks, ergonomics and risks of work, absence possibilities, family relationships, coping and difficulties in combining farm and household work), and c) the position of women on farms. The phases of the case study research are presented in Figure 12.

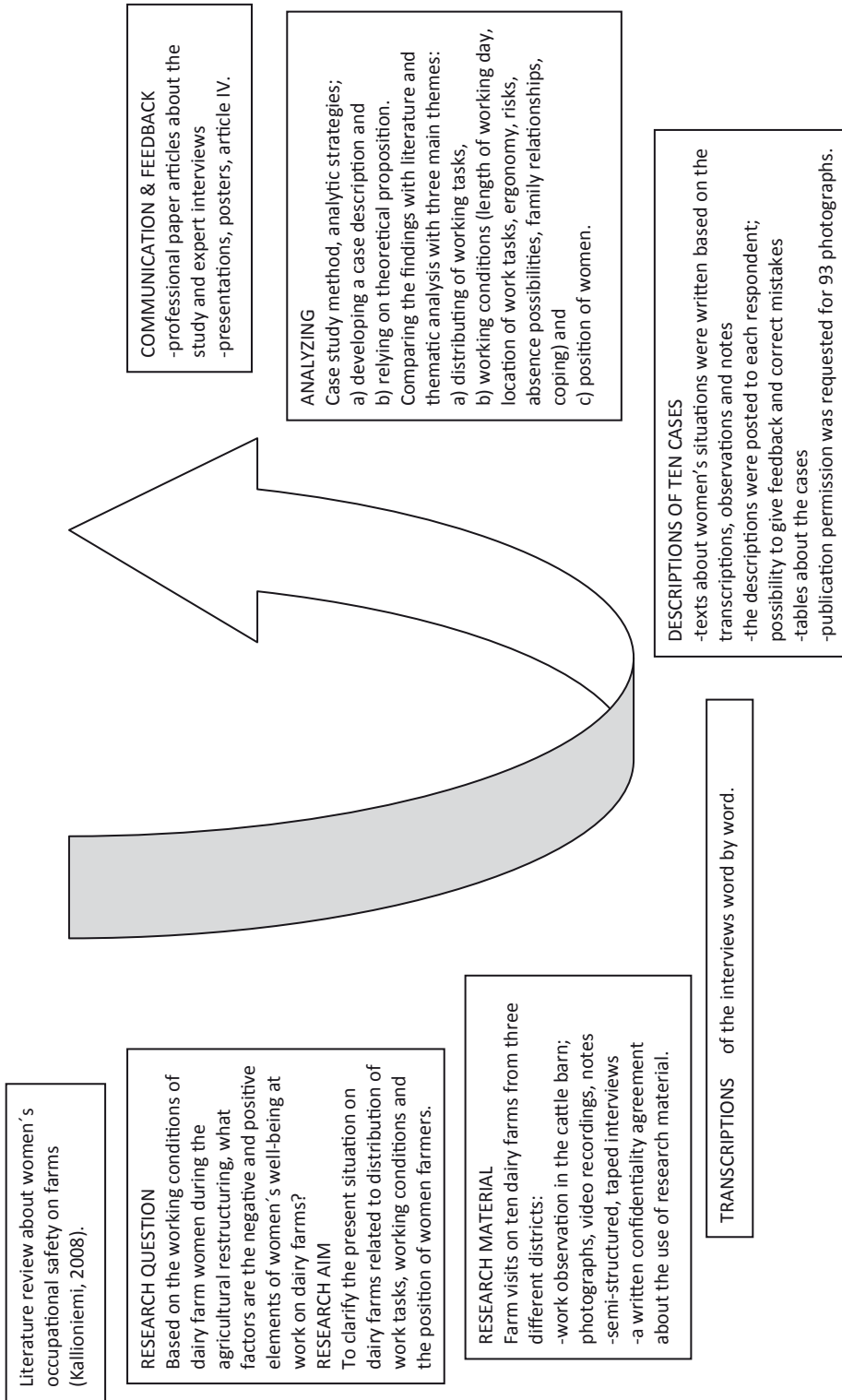


Figure 12. Different phases of the qualitative case study research (IV).

5 Results

5.1 The prevalence of stress and symptoms (I, II)

The prevalence of stress (I) in the telephone survey Farm2004 among Finnish full-time farm entrepreneurs and among the reference sample of the Finnish working population (Work2003; N = 2 335) is presented in Figure 13. The comparison indicates that the prevalence of stress (34%) among full-time farm entrepreneurs was lower than in general among the Finnish working population, i.e. the Work2003 sample (44%) (I). The prevalence of symptoms of mental workload and overworked were lower among full-time farm entrepreneurs than among the Finnish working population. Marital status was associated with the prevalence of stress among the Farm2004 sample; the highest stress level (31%) was among divorced or separated farm entrepreneurs. Education also had an association with stress; respondents who had a college or university level of education reported the most stress (41%).

The prevalences of 12 symptoms (II) in the Farm2004 sample and comparisons with the previous follow-up study, the Farm1992 sample, are presented in order of frequency in Figure 14. Symptoms of weakness or fatigue (prevalence 26%) and insomnia or difficulties in falling asleep (19%) were the most common symptoms in the Farm2004 sample, and both of these symptoms increased statistically significantly when compared with the Farm1992 and Farm2004 samples (Figure 14). The symptom of “insomnia or difficulties in falling asleep” was among the most common symptoms in the Farm2004 sample, but in the previous follow-up study (Farm1992 sample) this symptom was the seventh in order of frequency. The symptom of being overstrained or a feeling that everything is overwhelming was also common in the Farm2004 sample (16%). Dizziness, trembling or palpitations decreased statistically significantly among all respondents and among female respondents separately when comparing

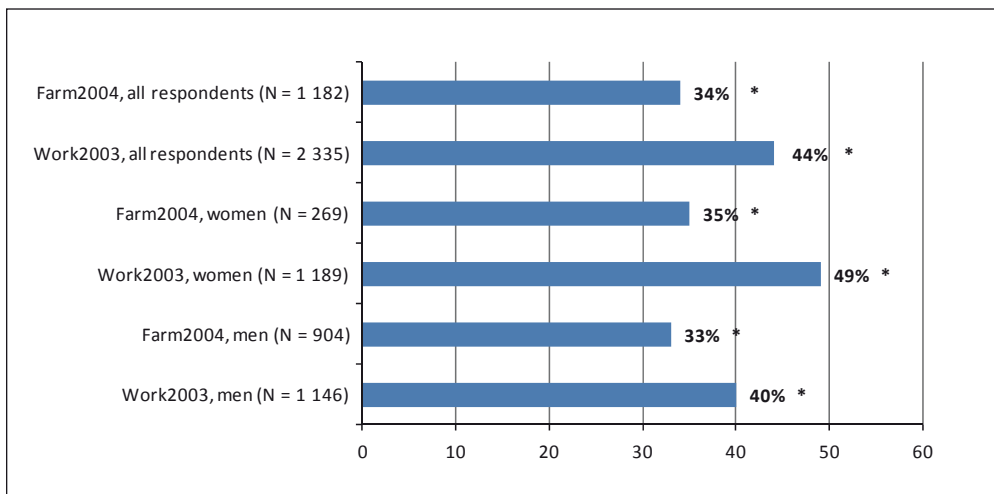


Figure 13. The prevalence of stress (%) within Farm2004 and Work2003 samples (I, V). An asterisk indicates statistically significant ($p < 0.05$) differences between samples.

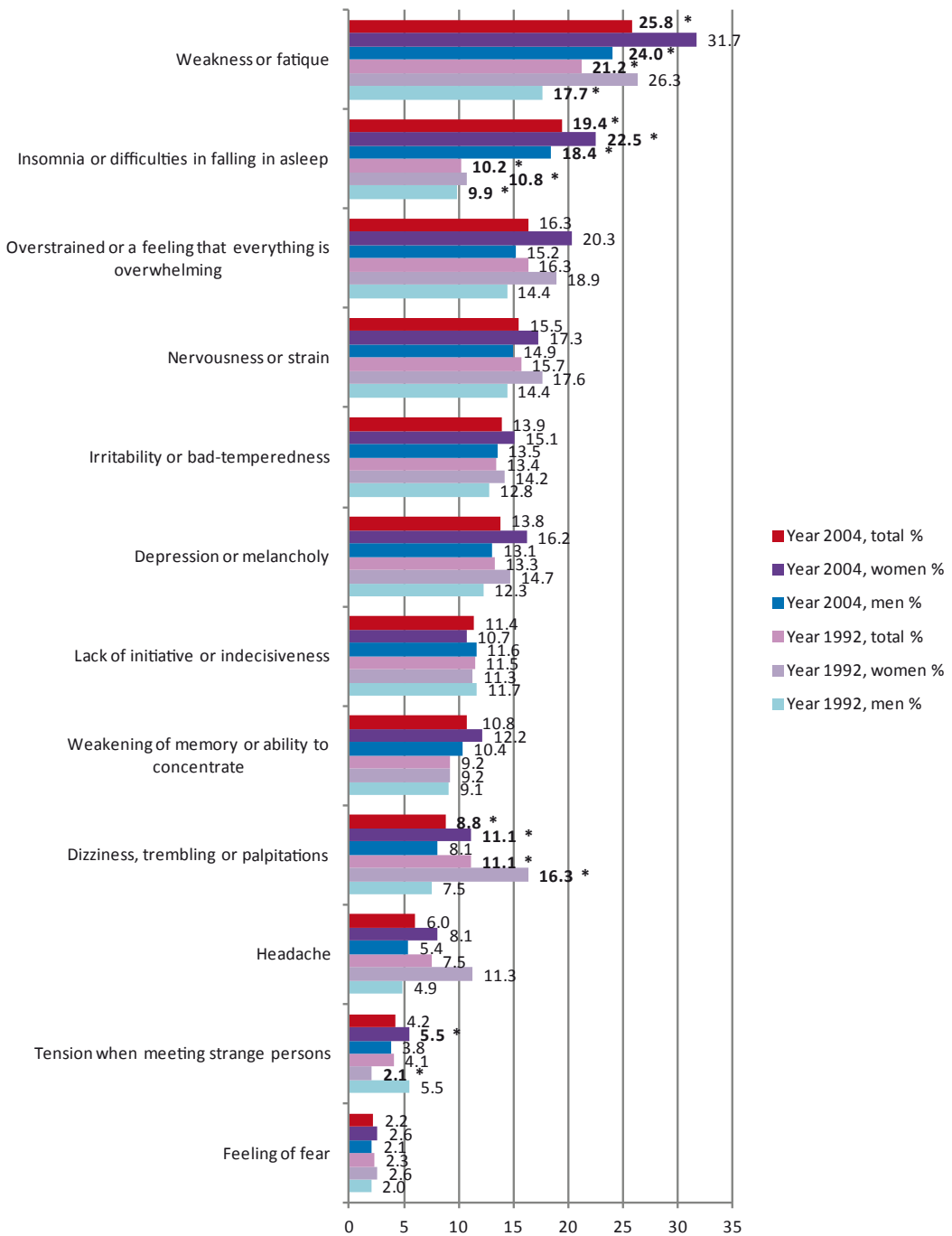


Figure 14. The prevalences of 12 symptoms within Farm2004 and Farm1992 samples (II). Bold font and * indicates statistically significant ($p < 0.05$) differences between samples.

the Farm1992 and Farm2004 samples. The prevalence of tension when meeting strange persons increased statistically significantly among female respondents between the Farm1992 and Farm2004 surveys. However, this symptom was not common: the prevalence was only 6% among female respondents and 4% among all respondents.

5.2 The variables associated with stress and symptoms (I, II)

The associations with the response variable “at least 3 symptoms” are presented in Figure 15 (II). The corresponding figure concerning the associations with the prevalence of stress is presented in literature review V (Figure 19.1).

Elements of social relationships, such as minor or a shortage of support from the spouse, neighbours, friends, relatives etc., or having a family member with whom the respondent had difficulties speaking, had the clearest association with the prevalence of stress. In addition, some or a lot of support from neighbours, friends, relatives, organizations, authorities etc. was associated with stress. A higher education at a college or university and a negative attitude towards the EU were also risk factors for stress. Two features of a respondent’s own state of health, namely illness or injury certified by a doctor or a low personal estimation of the working ability, were also associated with stress. In addition unadjusted odds ratios (OR) indicated associations: in combination, these were not associated with stress (adjusted OR), but alone they added to

the risk of stress (unadjusted OR). These kinds of associations were divorce or the ending of cohabitation, some, quite or very physical strenuousness of the farm work and a satisfactory, adequate or poor economic situation. Other demographic variables such as age, gender and size of farm were included in the analysis, but these variables were not statistically significant.

A feeling of strenuousness had the clearest association with the presence of at least 3 stress symptoms; a very hard or hard strenuousness of life and mentally very or quite strenuous agricultural work also had an association with at least 3 symptoms. Moreover, forestry as a production sector was a risk factor for at least 3 symptoms. The state of health, such as illness or injury certified by a doctor, a low estimation of working ability and no, only a little or some mental support from social relationships had an interconnection with symptoms. The usage of pesticides for over two weeks during the previous growing period also had an association with at least 3 symptoms, as did physical exercise during 1–2 days a week and a low number of years as an agricultural entrepreneur. Variables that alone added to the risk of mental symptoms (unadjusted OR) were difficulties in social relationships, for instance an adult in the family with whom the respondent had difficulties speaking, and the respondent also having difficulties in relationships with neighbours. A negative attitude towards the EU and the number of sick leave days during the previous six months independently increased the risk of mental symptoms.

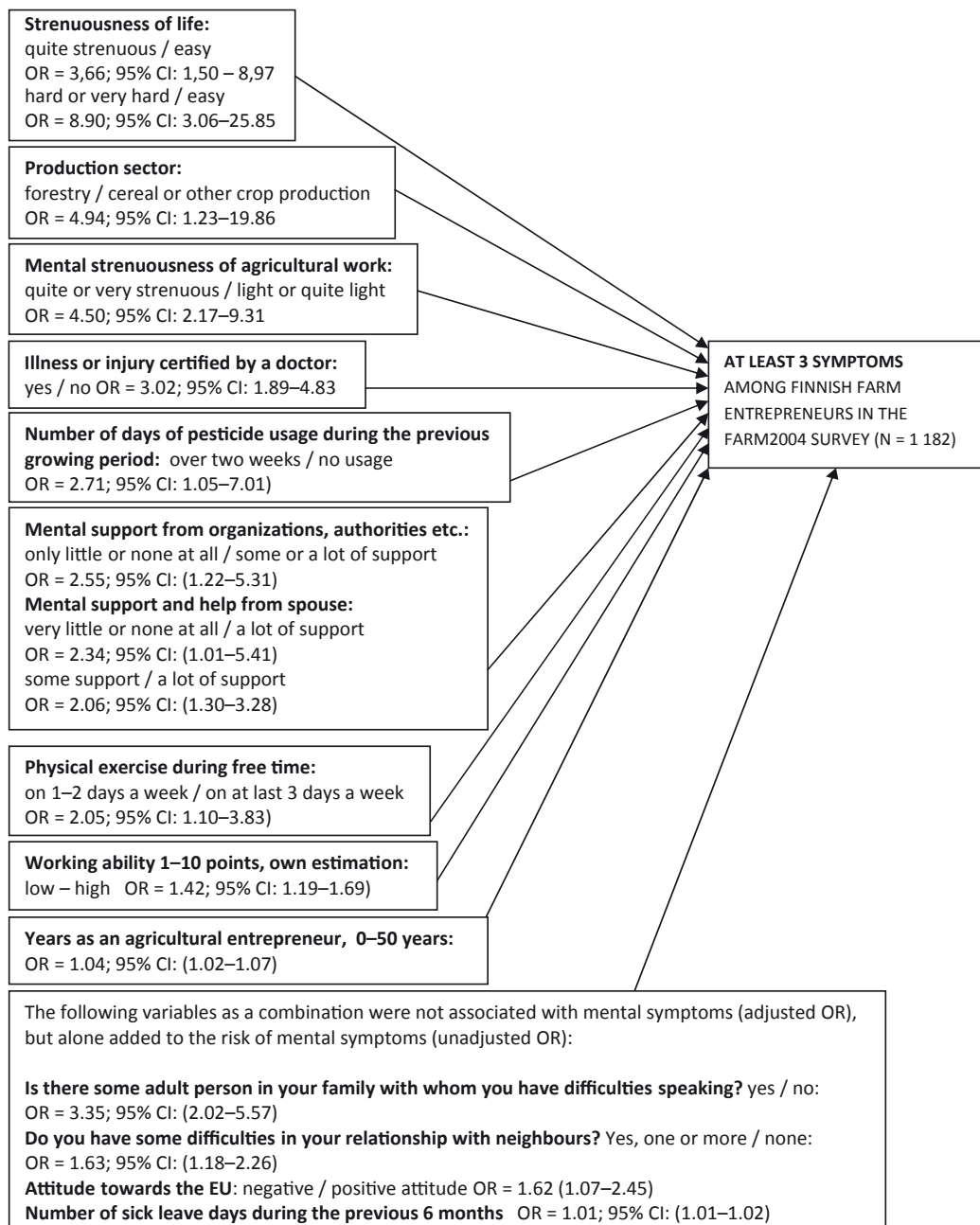


Figure 15. Associations with the response variable ‘at least 3 symptoms’ and predictor variables according to logistic regression analysis (II). OR indicates the odd ratios and CI the confidence intervals.

5.3 Occupational safety in animal handling work (III)

As one element of well-being at work, occupational safety during animal handling was studied (III) with a qualitative research method using grounded theory (Auerbach & Silverstein, 2003) and action research methods (McNiff & Whitehead, 2000). Information from the literature review (section 2.2 Safety) revealed that work tasks among farm animals represent one of most dangerous work environments on farms.

Occupational injuries were frequent among ten farm women on dairy farms. Eight respondents out of ten had suffered one or more injuries during the previous two years. The injuries were categorized according to Sinisalo (2007) as seven 'slight', two 'harmful' and one 'severe' injury. Marked differences were observed in the prevalence of injuries between study farms: some had experienced many injuries while the work of other respondents had been injury-free for decades. As examples, Tuula's last injury occurred with field machinery 20 years ago and Riikka's last sick leave was 15 years ago, during her pregnancy. Different relationships between cattle and handlers were observed, which may amplify the differences among respondents in injury incidences. Animals were involved in four of ten reported injuries, and were also involved in seven of the 13 reported near misses. In addition, animals were involved in four of nine injuries to other persons than the respondents on the dairy farms. During interview discussions, seven out of ten respondents viewed animals as being among the greatest injury hazards. In addition, animal behaviour was considered most often as a primary source of work-related harm.

Four animal handling strategies and relationships between animals and the stockpersons were synthesized (III) based

on the information gathered during the farm visits.

1. *Planning the work holistically*; considering both animal welfare and work safety. Several developments had been introduced in order to improve animal welfare and occupational safety. The aim was to create a more comfortable living environment for the cattle, which was expected to reduce animal stress. As a result, the animals became calmer, and the working environment of the stockpersons also became safer.

2. *Understanding animal behaviour*: good interaction with the animals, avoiding hurry and actions that cause fear of people in animals. Cattle become used to certain routines and handling methods.

3. *Being careful and prepared to protect oneself from the animals*. Just after calving, during oestrus and moving to the pasture during the spring are potentially dangerous time periods, when animal behaviour may be difficult to predict. Some animals may have "a social character"; these may also become aggressive if nobody has time to communicate with them.

4. *Avoiding the control of animals by force and avoiding unpleasant conditions for animals in the barn*. During the observation, in some cases animals were controlled by force. As a consequence, the animals may rush in panic or behave unexpectedly. These types of situation may put stockpersons in danger.

On the basis of the qualitative research results from dairy farm visits and the literature references concerning animal behaviour, we developed guidelines (III) in order to improve occupational safety in animal handling work. The following guidelines encourage the avoidance of animal stress caused by fear of humans. Improving the barn environment for animal comfort and worker safety will

make it easier to interact positively with the animals.

a) Habituate young calves to people through positive handling. The first days after calving are especially important. Thus, the stockperson should communicate with the calves, for example during feeding by scratching and talking (strategy 2).

b) Keep the physical conditions of the cattle barn animal-friendly. Let the animals move according to their own will. Do not pressure them. Avoid loud noises, slippery floors and cramped conditions (strategies 1, 3, and 4).

c) The estrus period and the time just after calving may markedly change an animal's behaviour because of the changing hormonal status. Sick or injured animals may also react aggressively towards the stockperson. Some means of self-defence is recommended while working among animals. In a calving pen, the stockperson should keep the man gate in mind and avoid being between a dam and her calf. If a bovine attacks, the stockperson should raise his or her hands, shout loudly and/or use a rod or other means to deflect the situation (strategy 3).

d) Cattle are gregarious animals and are easier to move and transport as a group. Avoid separation of an individual animal. If an individual animal needs to be separated, at least one familiar animal should be taken with it (strategies 1 and 2).

e) Cattle are responsive to positive, predictable routines in milking, feeding and cleaning (strategy 2).

f) The stockperson should be patient when working with cattle (strategy 2).

g) Cattle should not be dominated by force, even if force and rough handling may seem effective. Instead, gradually build a positive relationship, improve knowledge of animal

behaviour and observe cattle behaviour in order to know how each animal behaves individually (strategy 4).

5.4 Women's working conditions on dairy farms (IV)

The interviewed female respondents were involved in a wide range of work tasks on dairy farms. Work in the cattle barn on dairy farms and at home or near the home, in particular, were women's 'working areas'. On both farms with an automatic milking system, the woman was the main operator of this automatic system. Women were more seldom involved in fieldwork, but four respondents also drove field machines. Two women, Noora and Satu, had specialized in driving certain field machines such as the silage chopper, forage wagon or combine during fieldwork periods. Nearly all women took care of the household work, and only on one farm (Kristiina) was household work done together with the husband. It was also observed in the cattle barn that while women performed various physical tasks such as carrying, cleaning stalls or distributing feed, men distributed forage with farm machines.

On average the study women started working in the cattle barn at 6 a.m. and they ended their working on average at 6.30 p.m. They worked in cattle barns on average for 5 hours and 40 minutes per day. Working days varied according to the season and the situation on the farm. Only one woman in the sample described having time to herself between the working periods in the cattle barn during the early morning and evening. Other women organized different errands on the farm.

The women described positive features of their work; nearly all (8) considered work with animals and close to nature as being rewarding. On the other hand, half of the respondents considered their workload too heavy. Half of the women

had felt overworked during the previous month and had a feeling that the demands exceeded their personal capacity to take care of their duties.

The most often mentioned risk at work was dust (8). During seven interviews, difficult working postures, noise and chemicals were mentioned as occupational risks of work. In addition, in seven cases, heavy lifting or loads and reduced air quality were mentioned. The number of risks depended on the barn type; tie stall barns had the most risks (average 6.5), loose housing barns 4.2 risks and loose housing barns with an automatic milking system only 1–2 risks (dust and chemicals). Four respondents in the sample had had difficulties in combining pregnancy and physical farm work.

The women described a special worry related to their working conditions. During their husband's or their own sickness, farm work should somehow be organized. Despite the amount of work and special skills required to perform the tasks, the running of the farm should continue during situations of this kind. A fixed distribution of tasks would lead to difficulties if either partner in a farming couple became incapable of working. Women were afraid of this kind of situation. Heli assessed that in practice she is not able to receive training from the local extension worker. Family members, such as elderly parents or grown-up children, were considered as important persons to fall back on, because during sicknesses or holidays they were able to carry the responsibility for taking care of the farm and animals. Nearly all respondents (8) described some kind of problems related to holidays or sick leave. Three couples of the sample were not able to spend holidays together, because the absence of both spouses from the farm was considered too risky. Most respondents did not even try to organize their absence from work

during 'minor illnesses', instead they took painkillers and tried to cope with duties.

The interviews also elevated discussion about the meanings of old traditions and old mindsets, such as:

- a) The role of women on farms; should it be that of a 'self-sufficient farm woman' or a networked person?
- b) Is 'real farm work' only physical work with a real end result, and administrative work with a computer something else?
- c) What are the invisible rules of social relationships in rural areas?
- d) The distribution of work tasks according to gender (e.g. Mary's husband simply did not milk cows and Heli was not able to transfer silage from the clamp), and
- e) How household work is considered; is it part of private life or included in farm work?

These traditions and cultural rules may have a certain invisible influence on a woman's daily routines, tasks and well-being at work.

A question about what would be a suitable professional title raised discussion during the farm visits: most of the women (6) chose 'farm entrepreneur' as their professional title, while three chose the old title 'farm wife' ('emäntä' in Finnish) and one chose 'farmer'. Riikka considered the old title 'farm wife' to represent a different kind of work role. The authorities had prefilled an old job title, 'laboratory assistant', in Riikka's tax forms (she had worked in a laboratory 23 years previously). Heli remembered that correct title is 'farm entrepreneur's spouse', and Noora wondered how different titles were in use in different contexts. Nearly all the women (8) worked on a farm as a consequence of marriage to or courtship with a farmer.

The women's role on the farm was more or less that of a manager; they made

plans for the future of the farm and all respondents in the sample described how they took part in farm-related decision making. Despite this, Noora marvelled at how women 'fade' from the farm unity. She partly owned her farm, but despite this the official interaction from authorities and rural co-operatives was directed to the

male farmer: according to official system, there can only be one main farmer per farm. Noora wondered how this treatment affected women's self-respect or well-being at work. Tuula pointed out how a woman's situation on a farm may be difficult if she does not receive any money for her own purposes.

6 Discussion

6.1 Stress and symptoms (I, II, V)

A positive result from this study concerning well-being at work among farmers is the lower prevalence of stress among full-time farm entrepreneurs than among the Finnish working population in general (I, V). It may be assessed that those who have decided to continue agricultural production are prepared for changes and have the capacity to cope with stressful situations (I, V). Using a postal survey, Laitalainen et al. (2008) studied people (N = 357) who gave up farming during the period 1995–2005. After being a farmer, most of them had the occupational status of a blue-collar worker (44%) or an entrepreneur (17%). The most common reasons for giving up farming were 'external forces' such as political decisions related to farming, negative attitudes towards farming in society, poor future prospects and economic problems. The study revealed both positive and negative features of emotional well-being after farming; self-enhancing attributions improved well-being, whereas blaming external forces had negative or injurious psychological effects (Laitalainen et al., 2008). A Norwegian study by Melberg (2003) assessed farmers as persons who are able to cope with and

seek solutions to problematic life situations. In addition, living on a farm was found to have positive features related to mental health. Also Silvasti (2001) described the positive elements of working on farms, such as freedom, working close to nature and with farm animals. Furthermore, rural areas were described as safe and comfortable living environments. "Green care" is a rather new model to utilize rural environment and farms in order to improve and treat mental, physical and social well-being by for example animal-assisted or garden therapy (Korhonen et al., 2011). A follow-up study on working conditions (N = 4 392) in Finland among different occupational sectors during three decades (Lehto & Sutela, 2008) informed that farmers in particular were rather satisfied with their work compared to other occupational sectors. Only workers in administrative leadership roles (32%) were more satisfied, while those working in teaching were as satisfied as farmers (31%) (Lehto & Sutela, 2008). It may be concluded, that several studies have reported positive features related to well-being at work in agriculture.

On the other hand, the telephone survey (II) revealed the following as the three

most common symptoms among full-time farm entrepreneurs (N = 1 182) in 2004:

- a) weakness or fatigue, prevalence 26%;
- b) insomnia or difficulties in falling asleep, prevalence 19%;
- c) being overstrained or feeling that everything is overwhelming, prevalence 16%.

Symptoms a) and b) had increased statistically significantly in the 2004 study compared to the earlier follow-up study in 1992 (II). In 1992 the symptom 'insomnia or difficulties in falling asleep' was seventh in order of frequency, but in 2004 this had become the second most common symptom. These results indicate serious tiredness.

A literature review (V) gathered information from the scientific literature on stressors among farm entrepreneurs. From 16 different references, a total of 28 different stressors (V, Table 19.3) were identified. The most commonly mentioned stress elements among farm entrepreneurs were the following:

- a) The farm economy (seven references).
- b) Regulations, including farming bureaucracy, the amount of paperwork and the political framework related to agriculture (seven references).
- c) The weather and natural conditions of agriculture (five references).
- d) Dangers in farm work; injuries and deficiencies of the work environment (five references).
- e) New legislation (four references).
- f) Time pressure (three references).
- g) Work overload (three references).
- h) Role conflicts (three references).
- j) Health problems (three references).

In addition to tiredness and stressors among farm entrepreneurs, other negative research results concerning the state of health among farm entrepreneurs have been reported. Studies have compared

work ability among farm entrepreneurs, other entrepreneurs and employed workers in Finland (Peltoniemi, 2005; Saarni et al., 2008; Martelin et al., 2010). These studies have yielded similar results: the lowest work ability has been among farm entrepreneurs. The study sample of Peltoniemi (2005) comprised 3 608 respondents (including employed persons and other entrepreneurs), among them being 550 farm entrepreneurs. The work ability index was on average 10% lower among farm entrepreneurs than among other two groups, but especially low work ability was recorded among female farm entrepreneurs: 14% of female farm entrepreneurs estimated their work ability to be inadequate for their work duties (Peltoniemi, 2005). Karttunen & Rautiainen (2009) also found a greater decline in work ability with age among female dairy farmers compared to males; one-fourth of female farmers and one-tenth of male farmers had "an imminent risk of disability". Some possible reasons related to the low work ability among farmers have been proposed (Peltoniemi, 2005), including uncertainty about the future, long working days and physically demanding work. Up to 80% of farm entrepreneurs considered that an illness or illnesses negatively affected their work (Peltoniemi, 2005). Also Martelin et al. (2010) and Lehto & Sutela (2008) stated that physical strain associated with the working environment is especially common among farm entrepreneurs. The following features have been listed as particularly prevalent among farm entrepreneurs compared to other occupational sectors (Lehto & Sutela, 2008): working postures are difficult, work movements are repetitive and the work includes heavy loads, noise and injury risk.

A study by Saarni et al. (2008) was based on a representative sample (N = 5 834) of Finnish citizens, including 129 (2.5%) full-time farmers. The measurements for farmers were the lowest in work ability, subjective

quality of life and health-related quality of life, mainly because of psychosocial problems, physical inconvenience and a low personal estimation of work ability. It has been suggested Saarni et al., 2008; Martelin et al., 2010) that farmers consider it difficult to cease their profession, leading entrepreneurs with health problems to continue working despite their low work ability. In addition, Saarni et al. (2008) considered the demands of agriculture to be “very different” from those within other types of enterprises. Interestingly, Saarni et al. (2008) referred to the job demand-control (JDC) model (Theorell & Karasek, 1996) and assessed the situation of Finnish farmers as “low control, low support, and high demand”. According to this stress model (Theorell & Karasek, 1996), a work situation with the above-mentioned features increases the risk of psychological strain and physical illness. This potentially serious situation among Finnish farmers raises the question whether these low measurements of work ability have been able to describe the difficulties among farm entrepreneurs, including the combination of conflict between environmental demands and available resources (Theorell and Karasek, 1996), physical work load and problems related to health status.

Perkiö-Mäkelä et al. (2006b) reported that the prevalence of doctor-certificated chronic diseases was as common among male farm entrepreneurs (38%) as among Finnish working men in general, but farm women had more doctor-certificated chronic diseases (44%) than Finnish working women in general (39%). The frequency of doctor-certificated chronic diseases among farm women had increased compared to the earlier follow-up study in 1992 (Perkiö-Mäkelä et al., 2006b). In 2010, the three most common causes of disability pensions among farm entrepreneurs in Finland (Rautiainen et al., 2012) were “musculoskeletal, connective tissue” (share 37.2% of all disability pensions), “mental and behavioural

disorders” (share 16.4%) and “injury, external cause” (share 21.1%). Pensola et al. (2010) studied disability pensions among different occupational sectors in Finland: among all Finnish women relatively high proportions of disability pensions were observed among cleaners, nurses, salespersons and female farm entrepreneurs. Aittomäki (2008) concluded in his doctoral thesis that physical work conditions have a clear association with social-class differences in health problems, such as prevalence of diseases and problems with human functionality. This association with health problems was stronger among women than among men. The main reason (nearly 50%) for “such inequalities in women” was attributable to physical workload (Aittomäki, 2008). Aittomäki (2008) concluded that the effect of workload on human functionality increases with age more among women than among men.

A postal survey among dairy farmers (N = 265) (Kallioniemi et al., 2011) revealed that the respondents as a group were classified having “slight symptoms of burnout”, measured with the Maslach Burnout Inventory (MBI-GS) (Maslach & Leiter, 1997; Kalimo et al., 2006). The respondents were categorized into three groups by the MBI-GS: 46% of respondents did not have any burnout symptoms, nearly half (45%) had slight symptoms of burnout and 9% had severe symptoms. The symptoms (II) of weakness or fatigue (prevalence 26%) and sleeping problems (prevalence 19%) may be seen as earlier, anticipatory results concerning tiredness, yet it was a surprise that the respondents of this postal survey among dairy farmers (Kallioniemi et al., 2011) were on average categorized as having “slight symptoms of burnout”.

Kalimo & Toppinen (1997) described the development of burn-out with a figure which begins from a situation referring to a commonly used definition of stress; the

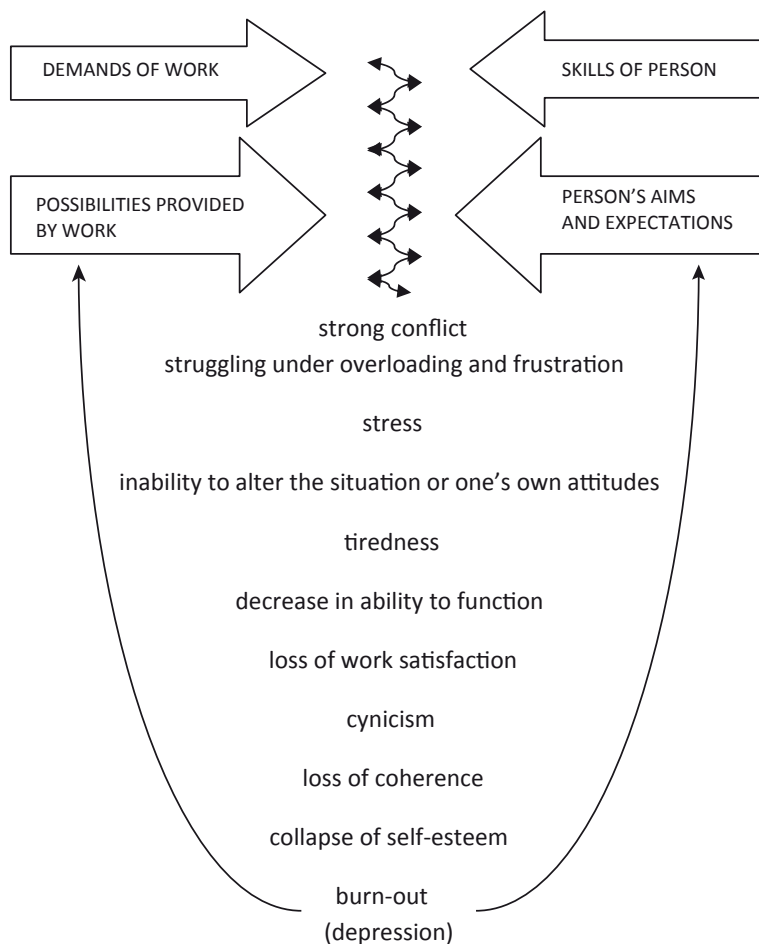


Figure 16. The development of burn-out as illustrated by Kalimo & Toppinen (1997). The figure is reproduced from the Finnish version with permission from Raija Kalimo and Salla Toppinen-Tanner (both obtained January 30, 2013).

demands and resources of human beings do not correspond and gradually, with continuing pressure the situation proceeds to burn-out (Figure 16).

Important background information related to tiredness among full-time farm entrepreneurs has been reported by Statistics Finland. Time use among Finnish citizens has been assessed with three follow-up research studies: the first was conducted from 1987–1988, the second from 1999–2000 and the third from 2009–2010

(N = 3 795) (Pääkkönen & Hanifi, 2011). The results concerning working time per year among male respondents and among different socio-economical sectors indicated that male farm entrepreneurs worked the greatest number of hours per year during all three follow-up studies (Figure 17). The working time of men among other socio-economical groups has declined during the past decade, but among male farm entrepreneurs the working time has increased (Pääkkönen & Hanifi, 2011).

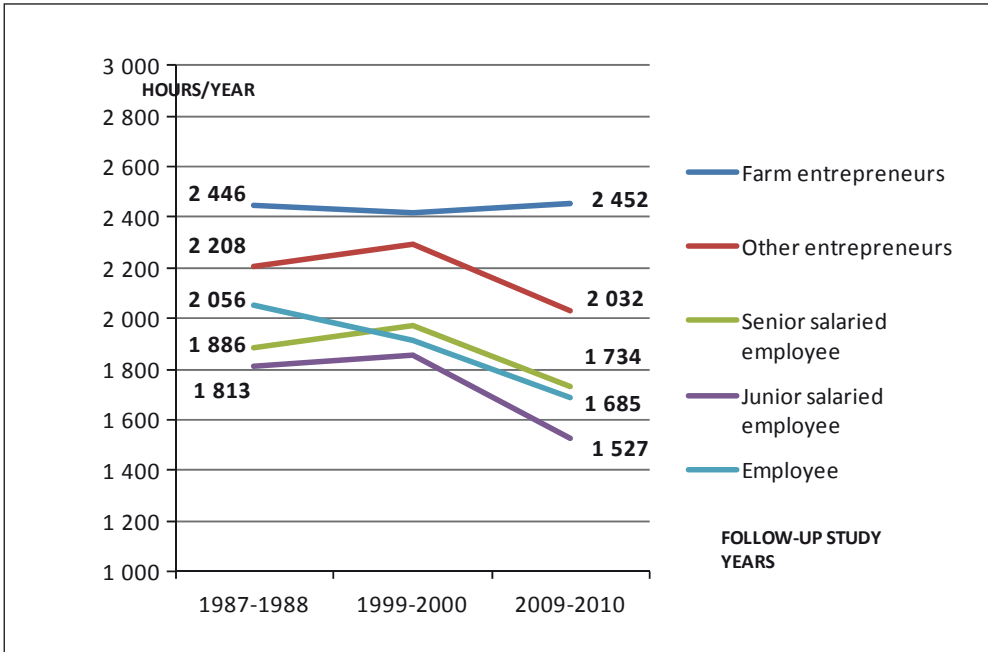


Figure 17. Working time per year among male respondents within different socio-economical groups. The results are from three follow-up studies conducted by Statistics Finland (Pääkkönen & Hanifi, 2011).

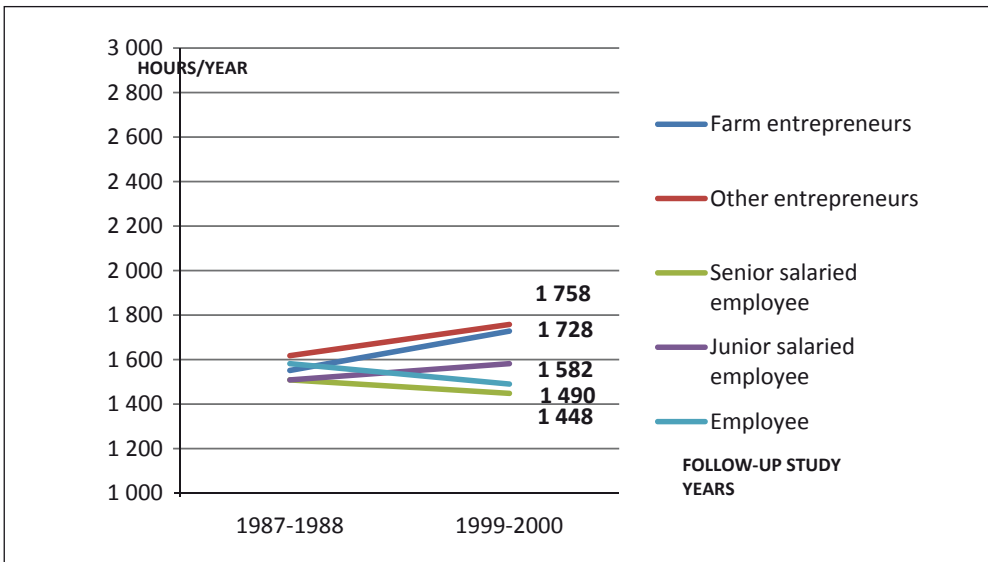


Figure 18. Working time per year among female respondents within different socio-economical groups. The results are from two follow-up studies conducted by Statistics Finland (Pääkkönen & Hanifi, 2011).

Information on women's working time on farms is only available from the periods 1987–1988 and 1999–2000 (Figure 18). Among other socio-economical groups, the working time per year among female farm entrepreneurs (1 728 hours per year) was the second greatest after other entrepreneurs (Pääkkönen & Hanifi, 2011).

The total working time, also including time spent on household work, among female and male farm entrepreneurs is presented in Table 7. According to study results from 1999–2000 (Pääkkönen & Hanifi, 2011), the total working time among female farm entrepreneurs was 3 602 hours per year and among male farm entrepreneurs 3 163 hours per year, if time spent on household work is included in the calculation of the total working time. The usual method is to report working time without including time spent on household work, and this type of information implies that the working time is greater among male farm entrepreneurs (Pääkkönen & Hanifi, 2011). As we stated in article IV, household work should also be counted as working time on farms, e.g. farms utilize salaried workers or contractors at least during certain periods of the year,

or household work may be based on an agreement between the current and previous farm entrepreneurs.

Agricultural data from 2010 reveal that during the past ten years the number of persons working in the agricultural sector has decreased by 30%, whereas the working hours performed have decreased only by 13% (Kyyrä et al., 2011). Thus, those who remain work longer days than earlier.

Hard work has been assessed as a crucial value related to entrepreneurial identity among family entrepreneurs (Laakkonen, 2012). Research results concerning tiredness (II) and low work ability among farm entrepreneurs (Peltoniemi, 2005; Saarni et al., 2008; Martelin et al., 2010) raise the question; have demands for more effective agricultural production, combined with the declining economic situation and the crucial value of hard working posed a danger for maintaining work ability among farm entrepreneurs?

Positive and negative research results related to the well-being at work of farm entrepreneurs are gathered in Figure 19.

Table 7. Time spent on working and household work among female and male farm entrepreneurs according to surveys in 1987–1988 and 1999–2000. “Working time, hours per year” is information from report of Pääkkönen & Hanifi (2011), Statistics Finland. “Household work, hours per year” and “Total working time / year” are calculated based on information Pääkkönen & Hanifi (2011), Statistics Finland.

Time period (years) of surveys	Working time, hours per year		Household work, hours per year		Total working time / year	
	Female farmers	Male farmers	Female farmers	Male farmers	Female farmers	Male farmers
1987–1988	1 551	2 446	1 898	706	3 449	3 152
1999–2000	1 728	2 415	1 874	748	3 602	3 163

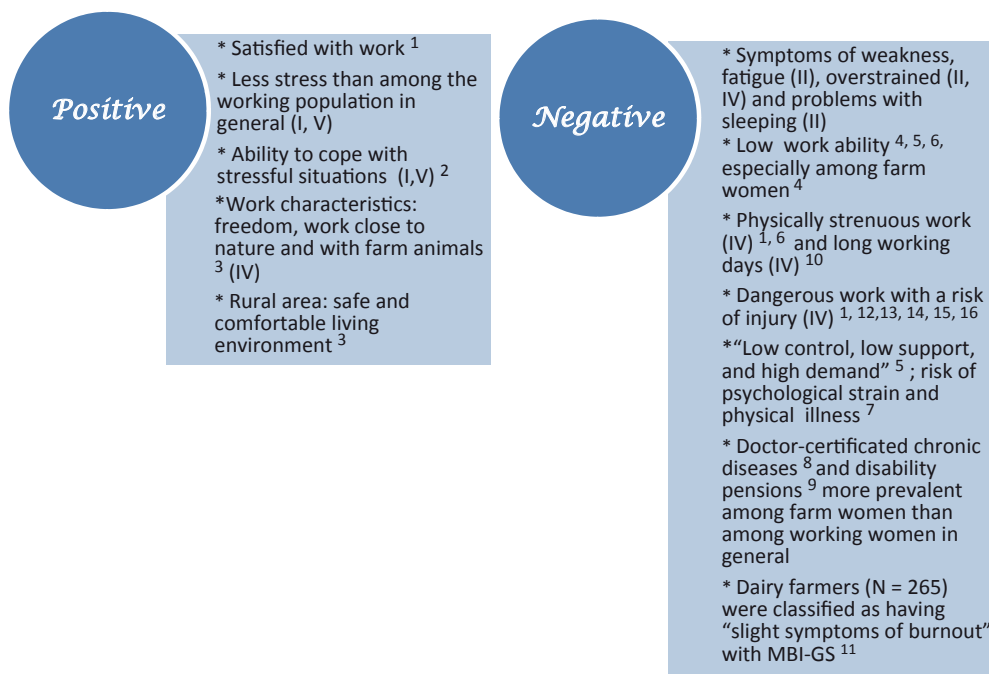


Figure 19. Research results and literature references concerning well-being at work among farm entrepreneurs.

Sources in addition to articles I, II, III, IV and V:

- (1) Lehto & Sutela, 2008
- (2) Melberg, 2003
- (3) Silvasti, 2001
- (4) Peltoniemi, 2005
- (5) Saarni et al., 2008
- (6) Martelin et al., 2010
- (7) Theorell & Karasek, 1996
- (8) Perkiö-Mäkelä et al., 2006b
- (9) Pensola et al., 2010
- (10) Pääkkönen & Hanifi, 2011
- (11) Kallioniemi et al., 2011
- (12) Commission of the European Communities, 2002
- (13) Tilastokeskus, 2011
- (14) Farmers' Social Insurance Institution, 2012
- (15) Rautiainen et al., 2005b
- (16) Pinzke & Lundqvist, 2007

6.2 Associations with stress and symptoms (I, II, V)

Social support and health problems were associated with stress within a sample of full-time farm entrepreneurs (I, V). The state of health is also a key element of well-being at work according to the framework of Danna & Griffin (1999) (presented earlier in section 2.1 Stress, page 19). On the other hand, the association of stress and the level of education was rather surprising (I, V). Perhaps respondents with a higher educational level are more conscious of the high demands related to the agricultural sector, or education may provide skills to recognize and profess stress symptoms. In addition, some respondents possibly have an education in some other profession than agriculture. Women in particular often enter farm work as a consequence of marriage to or courtship with a farmer, and this situation may cause ambiguity. A negative attitude towards the EU was also a risk factor for stress. An earlier follow-up study conducted during 1997–2001 (Leskinen, 2004) found that administrative duties related to EU regulations raised strong feelings during study interviews. Those farmers who did not receive enough help to cope with administrative duties of the EU had more depressive symptoms and their feeling of coherence was weaker (Leskinen, 2004). During the farm visits on dairy farms (IV) the consequences of EU membership were revealed during the discussions. Heli described the feeling of fear related to subsidy controls, because there is no flexibility and human errors are not allowed. Vuokko would have changed the income mechanism so that producing foodstuff would be profitable, not just owning fields or having a certain number of farm animals. Coping was one of the main themes during farm visits (IV) and increased work load was considered as a consequence of EU membership.

The associations with ‘at least three symptoms’ (II, Figure 15) revealed risk

factors that have also been found in earlier published studies on well-being at work: the strenuousness of life or agricultural work (also Lehto & Sutela, 2008; Palmgren et al., 2010), health problems and a lower work ability (Peltoniemi, 2005; Perkiö-Mäkelä et al., 2006b; Saarni et al., 2008; Martelin et al., 2010). Furthermore, a lack of social support associated with ‘at least three symptoms’ (II), and earlier the same factor associated with stress (I, V).

The association between the variable ‘over two weeks of pesticide usage during the previous growing period’ and ‘at least 3 symptoms’ was unexpected (II). On the other hand, several literature references report associations between pesticide exposure and mental symptoms. Stephens et al. (1995) studied 146 sheep farmers in the UK and concluded that exposure to organophosphate-based pesticides elevated alterations in the nervous system, causing a “greater vulnerability to psychiatric disorder” (Stephens et al., 1995). A study of 251 suicide cases in Spain (Parrón et al., 1996) concluded that chronic exposure to pesticides may cause depression, which is a risk factor for suicide. Amr et al. (1997) reported a study that included 603 persons who were psychiatrically assessed. Persons with exposure to pesticides had “significantly higher frequencies of psychiatric disorders”, especially depressive neurosis, and the most common symptoms were irritability and erectile dysfunction (Amr et al., 1997). A study from Egypt (Farahat et al., 2003) also concluded that exposure to organophosphorous affected “verbal abstraction, attention, and memory” among study participants (N = 52 + 50 controls). Also according to studies of Carruth and Logan (2002), Stallones and Beseler (2002) and Beseler et al. (2008), the depressive symptoms have been found to be more prevalent among those who have been exposed to pesticides. A larger sample of 18 782 pesticide applicators from the USA (Kamel et al., 2005) found an association with

“self-reported neurologic symptoms” and exposures to fumigants, organophosphate and organochlorine insecticides. Based on these several literature references, it may be concluded that pesticide exposure has an association with mental symptoms.

Different background variables that had associations with stress and at least three mental symptoms are presented without numeric information in Figure 20. The background variables are grouped into ‘social relationships’, ‘health’, ‘personal situation’, ‘farm work’ and ‘farm’ variables. In general, problems with social relationships, a lack of social support, a feeling of strenuousness and variables related to the lowered state of health of respondents had an association with stress and mental health symptoms.

6.3 Occupational safety during animal handling work (III)

Farm interviews with female farm entrepreneurs revealed that farm injuries were frequent among the respondents, because nearly all (8/10) had suffered one or more injuries during the past two years. Most of the women (7/10) viewed animals as among the greatest injury hazards. In addition, animal behaviour was considered most often as the primary source of work-related harm. Overall, animals had a crucial role in occupational safety on the ten farms involved in this study. The farm visits raised a basic question: why were injuries more prevalent among some respondents, while others had been able to work without injuries for several years? The injury cases within the study sample did not have an apparent association with the barn type. During work observation, differences were noted in relationships between animal handlers and cattle. Women also described in the cattle barn and during interviews their habits and experiences with farm animals.

Based on the research material, different animal handling strategies were distinguished within the study sample. Based on the study results and literature references concerning animal behaviour, we developed guidelines to improve occupational safety during work tasks among farm animals. These guidelines enable animal stress and fear of humans among farm animals to be avoided. A positive relationship and trust between the cattle and the stockperson (III) are important elements increasing occupational safety. By following the prepared guidelines (III), it is possible to gradually build a positive cow-handler relationship. Unpleasant circumstances and making the animal fearful of people may cause stress and fear among cattle. The unpredictable behaviour of bovines may cause dangerous situations for cattle handlers (III).

Publications and texts are available concerning the safe handling of dairy cattle, e.g. including a book chapter (Grandin, 1999), research reports (Lätti et al., 2004), internet texts (e.g. Hallman & Demmin, 1995), and professional magazine articles (Mälkiä, 2006; Tirkkonen, 2006). Tirkkonen (2006) noted how research information on animal behaviour has markedly advanced during recent years. She proposed a shift in animal handling from “authoritarian leadership” methods towards teamwork where every participant’s special characteristics (including cattle) are respected. Mälkiä (2006) also considered the current development related to animal husbandry; livestock farms are larger and more technology is in use, for example, during milking and the distribution of forage. Those animal-human relationships that still remain may be rather rare and negative experiences for the animals. Thus, it is a possible danger that animals will become fearful of humans. This phenomenon is considered by Mälkiä (2006) to have a negative impact on productivity, animal welfare and the

ethicality of animal husbandry. On the other hand, technologies may also help to improve animal welfare and follow-up operations.

Some educational publications focus on occupational safety on farms in Finland. Värri ed. (2002) and Mäkynen et al. (2005) have written guidebooks about safety on farms, which include the following information about safety during animal handling. An animal's behaviour may be difficult to predict and a nervous animal may attack; dangerous animals must be transferred so that human beings do not go to the same enclosure as the animal; a person should not turn his or her back on a freely moving animal. One research report (Lätti et al., 2004) about occupational safety during transfers of cattle included information about animal behaviour.

Finnish legislation and regulation on the protection of animals includes guidelines on their living environment and animal handling. The aim of legislation related to animal protection is to enhance animal welfare and improve handling (Eläinsuojelulaki, 1996; Evira, 2008). Animals should be handled calmly, avoiding animal fear (Eläinsuojeluasetus, 1996). The European Welfare Quality® project established a method to evaluate animal welfare (Welfare Quality®, 2009), which in general includes measurements and evaluations of animal feeding, housing, health and also 'appropriate behaviour'. The latter evaluation point, 'appropriate behaviour' of cows, includes assessments of a "good human-animal relationship" and "positive emotional state". The relationship between the cattle handler and cows is assessed with a test in which animals are approached and their behaviour is observed; they either avoid approaching the person or allow the observer to touch them. The emotional state of cattle is assessed by observing cattle behaviour as a group; suitable adjectives to describe the cattle behaviour are then chosen from a

list, and 'fearful' is included in this list. Among calves, the 'absence of fearfulness' is also assessed by evaluating how calves behave as a group (Welfare Quality®, 2009). Grandin (1999; 2007) noted how even a single unpleasant occurrence may provoke a strong feeling of fear in an animal, and this feeling is difficult to overcome afterwards. Cattle have a good memory and remember rough handling (Grandin, 2007). Another basic fact is that cattle are gregarious animals and they therefore need to be in the company of other animals (Stewart, 1999).

Among veterinary training students, special courses are organized in order to train students to handle animals "safely, competently and with confidence" (Chapman et al., 2007; McGreevy, 2007). An animal handler should learn the behavioural rules of animals (Langley & Morrow, 2010; Grandin, 1999). Work among animals should be calm (Lindahl et al., 2011) and quiet (Grandin, 1999). MacLeay (2007) described how an animal handler has to understand the difference between a human being's "predator-based view" and a prey animal's survival sense. The main aim of an animal handler is to minimize stress among cattle through a positive handler-cattle relationship and tolerable environmental circumstances (Stewart, 1999). A handler should know each animal's personality (Baker & Lee, 1993) and be self-confident, not afraid of animals and she/he should have time to pat, chat and touch the cows (Stewart, 1999).

Albright & Fulwider (2007) defined skilful animal handlers as "confident introverts", with personal features such as being self-reliant, considerate, independent and persevering. Vainio et al. (2007) underlined how gender has a significant impact on attitudes related to animal welfare: for women, animal welfare is a substantially more important issue than among men. Kaarlenkaski (2012) also studied the

HEALTH

- *illness or injury certified by a doctor (st,sy)
- *low own estimation about working ability (st,sy)
- *number of sick leave days during the previous 6 months (unadj. sy)

FARM WORK

- *mental strenuousness of agricultural work (sy)
- *number of days of pesticide usage during the previous growing period (sy)
- *physical strenuousness of agricultural work (unadj. st)

PERSONAL SITUATION

- * strenuousness of life (sy)
- * college or university level education (st)
- * negative attitude towards the EU (st, unadj. sy)
- * physical exercise during free time on 1-2 days a week / on at last 3 days a week (sy)
- * low amount of years as agricultural entrepreneur (sy)

STRESS AND MENTAL SYMPTOMS AMONG FARM ENTREPRENEURS

FARM

- * production sector: forestry (sy)
- *satisfactory, adequate or bad economic situation (unadj. st)

SOCIAL RELATIONSHIPS

- *lack or only little mental support and help from spouse (st, sy)
- *there is a certain adult person in family whom the respondent have difficulties speaking with (st, unadj.sy)
- *only little or none at all mental support from organizations, authorities etc. (sy)
- *not at all, only a little, some or a lot of support from neighbours, friends, relatives, organizations, authorities etc. (st)
- *the respondent has some difficulties in the relationship with neighbours (unadj.sy)
- *change in life during the last year: divorce or ending of cohabitation (unadj. st)

Figure 20. Variables having associations with stress and symptoms (I,II,V) among full-time farm entrepreneurs in 2004. Abbreviations: 'st' = stress; 'sy' = mental symptoms, 'unadj.' = un-adjusted OR estimates.

relationship between humans and cattle based on selected writings which were collected by a writing competition among Finns. In addition to body and emotion, one key element of the relationship between humans and cows was gender; females appeared to understand cows more easily and they were considered to be able to guide cows' behaviour more easily than men. Both females and males wrote emotional writings about cows. Article III is based on the assumption that females and males are equally able to create a positive relationship with cattle.

Baker & Lee (1993) have reported the following basic rules for working among animals: work deliberately, as a matter of routine and calmly; do not move quickly and avoid loud noises; respect animals instead of being afraid of them; and have always an escape route in your mind. It may be concluded that similar rules and information have been presented earlier, but the references are scattered, for instance in professional articles and Internet texts, and only some references are available in the scientific literature. During recent years, animal behaviour and welfare science have produced new knowledge with which it is possible to create a safer working environment and gradually a better social relationship between farm animals and handlers, as suggested in article III.

6.4 Elements of women's well-being at work on dairy farms (IV)

A qualitative, descriptive study on the well-being at work of farm women (IV) illustrated (Siggelkow, 2007) everyday situations, working conditions and as well positive and negative features of well-being at work on dairy farms. Several literature references have informed about the dangers of farm work and farm injuries (Suutarinen, 2003; Rautiainen et al., 2005a; Taattola et al., 2007; Taattola et al., 2010; Tilastokeskus, 2011), but

among female farm entrepreneurs chronic diseases and lowered work ability seem to be the main problems (Peltoniemi, 2005; Perkiö-Mäkelä et al., 2006b; Karttunen & Rautiainen, 2009). A conceptual framework on the social determinants of health (Solar & Irwin, 2010) provides a chart to display the complex and multifaceted factors having an impact on equity in health and well-being (Figure 21). The framework has been developed by the World Health Organization (WHO), and it enables the working conditions among women on dairy farms to be considered.

The socioeconomic position (Figure 21) of women on dairy farms could be described by the characteristics of the farms on which the women work (IV). The farms in the sample were larger than on average in Finland. Those included in the study (III, IV) had on average 106 hectares of fields (average in Finland 35 hectares), 51 hectares of forest (average 49 hectares forest) and 45 cows/farm (average 25 cows/farm) (Väre, 2010, Niemi, 2010b). The respondents' length of experience of farm work varied from 7 (Satu) to 30 years (Virpi). Women in most cases entered farm work informally, through marriage or courtship (McGowan, 2011), and their official position on the farm is usually that of a family member (Tike, 2011) (Figure 1). It is possible that women do not receive any money for her own purposes (IV), perhaps because of the economic situation of the farm enterprise or because of structural changes on the farm that demand investments.

The political context (Figure 21) includes macroeconomic policies of agriculture. The study women considered wider concepts of the political and societal environment of agriculture to be basic elements creating well-being at work and motivation for everyday practices (IV). Culture and societal values include traditions and mindsets, which were revealed during the interviews (IV), and these issues may have

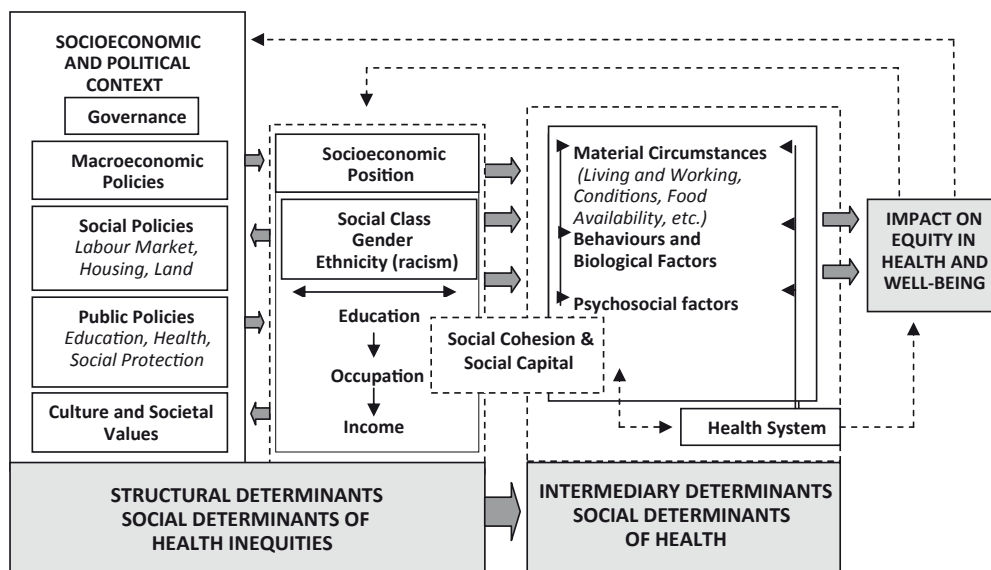


Figure 21. A conceptual framework of social determinants of health (Solar & Irwin, 2010). Permission to reproduce the figure was obtained (August 21, 2012) from Dolores Campanario, WHO.

an invisible influence on women’s daily tasks and well-being at work. Intermediary and social determinants of health (Figure 21) include living and working conditions. The women took part in a wide range of different tasks on the farm (IV). Especially work in the cattle barn and at home were women’s working areas, but four women also drove field machinery. The women’s work included physical tasks, half of them considered their work load too heavy, and working days were long. Coping was a theme that was discussed on nearly all study farms. Nearly all of the women (8) had some kind of problems related to holidays and sick leave.

The valuable contribution of women to agriculture should be recognized and supported, because women’s expertise is important in finding solutions for future challenges, such as sustainable, organic agriculture (Fenton et al., 2010) and animal welfare (Vainio et al., 2007). Women should be allowed to choose which

professional title they prefer to use and they should be considered as equal partners if they work full-time on a farm. Efforts should be made to improve knowledge of issues related, for example, to health risks on farms, the social security benefits of farm women and the official roles of farm entrepreneurs and their spouses. The Worldwatch Institute (Forte et al., 2011) concluded how the empowering of women in rural areas adds to well-being within the whole rural community.

Engberg (1993) underlined how we should first assess the work role and position of women on farms in order to identify the risks in their work and improve working conditions. Therefore, it is a deficiency that we do not have current, representative information on the work profile of women working on Finnish farms. Because of the structural change in Finnish agriculture, working conditions and the operational environment of farms have also changed. Our research sample, which is qualitative

and not representative, indicates that women currently have a more professional and essential work profile on farms than earlier (IV). Agriculture is an occupational sector that includes many occupational dangers for women (Polychronakis et al., 2008), including injuries, musculoskeletal problems because of strenuous work, repetitive tasks and heavy loads, solar radiation, noise, zoonoses, chemical risks from fertilizers, pesticides or herbicides, allergens, stress because of poor work satisfaction and insecurity, a low income and shortcomings related to working conditions, and the possible existence of violence and sexual harassment. Research results demonstrating a higher prevalence of diseases among women working on Finnish farms than among working women in Finland in general (Perkiö-Mäkelä et al. 2006b) and a low work ability among farm women (Peltoniemi, 2005) indicate the special occupational risks of farm work and problems in well-being at work (Schneider et al., 2011).

6.5 Well-being at work on farms

Research results of this thesis and literature references about well-being at work on farms in Finland may be gathered around the process of burn-out (see Figure 16), presented by Kalimo and Toppinen (1997). In the following (Figure 22) the process of burn-out (Kalimo & Toppinen, 1997) is now incorporated with specific information related to agriculture.

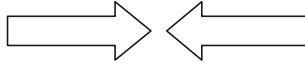
Rural living environment and farm work include positive features of well-being at work (Silvasti, 2001; Melberg, 2003; Lehto & Sutela, 2008; Korhonen et al., 2011; I, IV) (Figure 22). On the other hand, the current situation of agriculture also includes stressors such as on-going climate change, restructuring of agriculture (IV), dangers of farm work (III, IV, V) and work overload (IV, V, Pääkkönen & Hanifi, 2011). The demands of the environment

(Theorell & Karasek, 1996) may be greater than a farmer is able to cope with and this situation may give rise to negative outcomes. One phase of the development of burn out (Kalimo & Toppinen, 1997, Figure 16) is tiredness, which has also been identified as the symptom 'weakness or fatigue' or overstrained (II) among Finnish full-time farm entrepreneurs; within the qualitative study also women felt overworked and coping was a repeatedly discussed theme (IV). The following phase (Kalimo & Toppinen, 1997) is 'decrease of ability to function'; several studies have indicated the low work ability among farm entrepreneurs (Peltoniemi, 2005; Saarni et al., 2008; Martelin et al., 2010) and women described situations in which progressive illness hindered managing of farm work duties (IV). A recent research result concerning burn-out among dairy farmers (Kallioniemi et al., 2011) represents a result corresponding to the last phase of Figure 22.

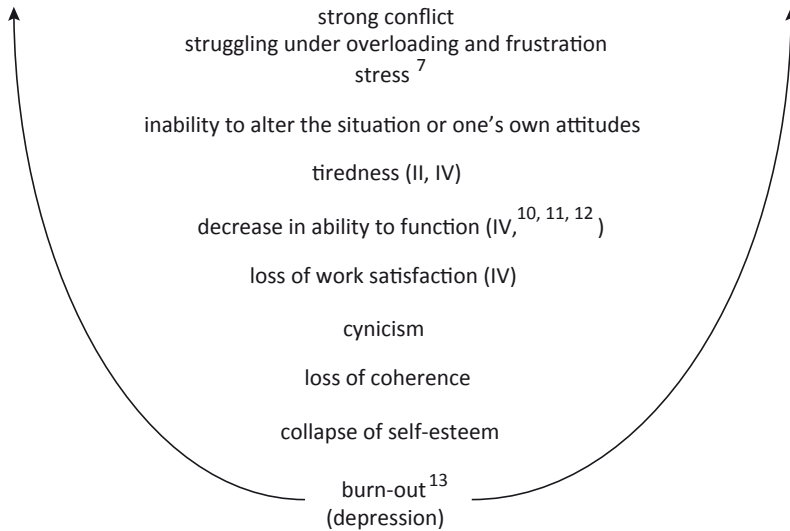
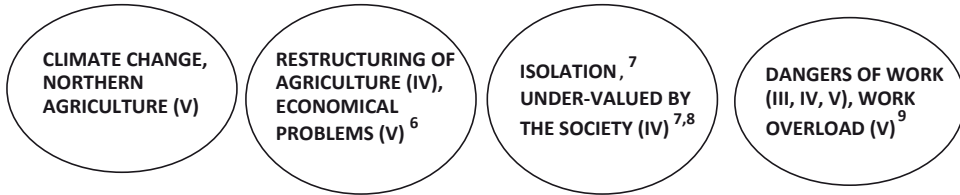
The features of rural conditions and cultural aspects should be taken into account whenever well-being at work among farm entrepreneurs is under consideration. Long distances and perhaps too few health services in rural areas may make it difficult to seek help. A poor economical situation may also limit e.g. possibilities to utilize therapy care. Furthermore, it has been observed that rural people do not always actively seek help for their mental health problems (Gregoire, 2002; Parry et al., 2005; DeArmond et al., 2006; Judd et al., 2006; Fuller et al., 2007). The possible reasons are that people with mental health problems may be socially stigmatized and may feel shame (Fuller et al., 2007). In addition, farmers have also been assessed as 'high mastery individuals' (Keating, 1987) and underlining self-sufficiency is a common value among rural citizens (Fuller et al., 2007). Work tasks with pesticides and exposures to these chemicals are associated with mental health symptoms (II; e.g. Kamel et al., 2005; Beseler et al.,

POSITIVE ELEMENTS OF WELL-BEING: WORK CLOSE TO NATURE AND WITH FARM ANIMALS (IV)^{1,2}, LOWER STRESS (I), THE FREEDOM OF AN ENTREPRENEUR (IV)^{1,2}, FARMERS ARE SATISFIED WITH THEIR WORK³. RURAL "GREEN CARE" IS BASED ON POSITIVE MENTAL, PHYSICAL AND SOCIAL EFFECTS OF RURAL ENVIRONMENT⁴.

CONFLICT BETWEEN THE DEMANDS OF THE ENVIRONMENT AND A PERSON'S RESOURCES & SKILLS⁵



STRESSORS AMONG FARM ENTREPRENEURS:



RURAL CONDITIONS AND CULTURAL BARRIERS MAY HINDER HELP SEEKING; LONG DISTANCES, SELF-SUFFICIENCY IS VALUED, FARMERS ARE 'HIGH MASTERY INDIVIDUALS'¹⁴; STIGMATIZATION BY RURAL SOCIETY^{15, 16} AND MENTAL PROBLEMS ARE CONSIDERED TO BE PART OF PRIVATE LIFE¹⁴. PESTICIDE EXPOSURE IS ASSOCIATED WITH MENTAL SYMPTOMS^{17, 18}, (II). DISCUSSION ABOUT SUICIDES AMONG FARMERS^{19, 20, 21}, (V).

Figure 22. Elements of well-being at work among farm entrepreneurs are combined with a figure of the burn-out process illustrated by Kalimo & Toppinen (1997).

Sources of Figure 22. in addition to articles I, II, III, IV and V:

- (1) Melberg, 2003
- (2) Silvasti, 2001
- (3) Lehto & Sutela, 2008

- (4) Korhonen et al., 2011
- (5) Theorell & Karasek, 1996
- (6) Ådahl, 2007
- (7) Uthardt, 2009
- (8) Lobley et al., 2004
- (9) Pääkkönen & Hanifi, 2011
- (10) Peltoniemi, 2005
- (11) Saarni et al., 2008
- (12) Martelin et al., 2010
- (13) Kallioniemi et al., 2011
- (14) Keating, 1987
- (15) Parry et al., 2005
- (16) Fuller et al., 2007
- (17) Kamel et al., 2005
- (18) Beseler et al., 2008
- (19) Monk, 2000
- (20) Patil & Somasundaram, 2010
- (21) Berry et al., 2011

2008). It can also be questioned whether the health care personnel is always aware about the diverse and complex conditions of agriculture (Merchant & Reynolds, 2008) and the existing cultural aspects of this sector. The research discussion about suicides must also be mentioned, although this topic is a sad one. Farmers have been observed to have an elevated risk of suicide in Australia (Yip et al., 2000), China (Kong & Zhang, 2010), India (Patil & Somasundaram, 2010), the UK (Meltzer et al., 2008) and the USA (Gunderson et al., 1993). Berry et al. (2011) cited recent discussion in Australia about the links of climate change effects, globalization, influence of agricultural policy and mental health problems among farmers.

6.6 Evaluation of the study material and research methods

Articles I, II are based on an extensive, computer-assisted telephone survey. This method is able to reach rather rapidly and economically a wide number of respondents. It is also able to obtain answers from those respondents who find it too difficult to fill in a questionnaire. Thus, the method is able to achieve a high respondent rate, and 86% participated in the telephone interview (I, II). The Information Centre of the Ministry of Agriculture and Forestry in Finland, Tike has available the phone numbers of all active Finnish farms. During the

interview, questions may be explained or terms may be defined to the respondents. Questions may also be chosen according to previous answers. A large number of questions were asked in the survey, so it was possible to determine the associations between stress and at least three symptoms and background variables. Furthermore, articles I, II are based on a large sample of 1 182 full-time farm entrepreneurs, which was a representative sample of full-time farm entrepreneurs in Finland. The regional distribution of respondents may be considered as representative of Finnish farm entrepreneurs. In addition, the differences between the Farm2004 sample and the Finnish farming population mainly exist because only full-time farmers were included in this study. On the other hand, the study sample (I, II) included more animal husbandry farms and especially dairy farms than their proportion of all active farms in Finland in 2004.

A personal interview would possibly be a better, more sensitive method to gather information about mental health, but it would also be more expensive. The benefits of telephone interviews are cost-efficiency and saving of time (Fontana & Prokos, 2007). As a method, structured interviewing produces standardized information. A positive feature is also a certain distance between interviewer and respondent (Fontana & Prokos, 2007); the interviewer has the possibility to focus on careful asking and the respondent

may possibly be able to concentrate more thoroughly on answering than in personal interviews. Their only means of connection is voice. In the case of the CATI system, interview personnel are perhaps more professional than an individual researcher would be, and the software used enabled them to conduct more complex interviews than during a face-to-face interview.

The reference sample Farm1992 (N = 928) was rather large and representative in terms of age and gender distribution, but the sample size was not adequate to be representative of all Finnish farm entrepreneurs in 1992. In addition, the prevalence of dairy farmers was higher in the sample (52%) than on average in Finland (31%).

The studies on stress and symptoms (I, II) were based on cross-sectional and self-report research material. Such methods are criticized as providing one-sided information. Instead, longitudinal studies and measures that are independent of self-report should be included (Kahn & Byosiere, 1992). Cox et al. (2000) described the self-reported data focusing on the appraisal process and on the experiences of stress as correct, but they also listed problems related to validity induced because of the phenomenon of “negative affectivity”. Human beings are different from each other in how much they are prone to “negative affectivity” and how much they focus on negative aspects of life and underline distress in different situations. In order to minimize the effects of this phenomenon Cox et al. (2000) recommend triangulation and gathering at least three different kinds of evidence; a) “the objective and subjective antecedents” of stress experiences, b) self-reported stress and c) “changes in behaviour, physiology of health status”. Article I was able to reveal only self-reported stress

among farm entrepreneurs and therefore it presents only one aspect of the listed evidence (Cox et al., 2000). On the other hand literature references e.g. about health status and mental health among farmers are also included in this thesis to improve the handling of this subject. In addition, Cox et al. (2000) mentioned presenting qualitative data with quantitative measures, which is applied in this thesis (III, IV).

Interdisciplinary research, “natural experiments” and research taking account the gender aspect are also mentioned as research needs (Kahn & Byosiere, 1992). An attempt was made to fulfil the latter two needs in articles III and IV, which were based on observations of women’s working conditions and interviews on dairy farms. Female respondents were met within their own working and living environment.

A qualitative study is not able to be representative of all Finnish dairy farms with a small sample size, but the strengths of qualitative studies include their provision of information about real-life situations and ability to help to create connections and theories (Siggelkow, 2007). Various kinds of triangulation were also in use (Denzin, 1970; Denscombe, 2007) in order to obtain a better understanding or more complete picture by examining the same feature from different perspectives. Data triangulation comprised augmenting findings with other research references, statistics and existing theories (Laine et al., 2007); the triangulation in collecting information comprised material gathering by interviews, observations, photographs and notes (Denscombe, 2007). Observations and interviews on each study farm added to the reliability and level of detail related to research material. These features are the strengths of a small study sample of female farm entrepreneurs.

7 Conclusions

1. The study revealed both positive and negative findings on well-being at work among farm entrepreneurs. In 2004, full-time farm entrepreneurs reported less stress than among Finnish working citizens in general (I, V). On the other hand, a quarter (26%) of farmers reported symptoms of weakness or fatigue and a fifth (19%) had problems with insomnia or difficulties in falling asleep (II). Literature references inform about long working days and low work ability among farm entrepreneurs. Based on the literature review, the most common stressors among farm entrepreneurs were the farm economy, regulations, the weather, dangers in farm work and new legislation (V).
2. Associated with both stress and 'at least three symptoms' were a lack of mental support from social relationships, illness or injury certified by a doctor and a low estimation of one's own working ability (I, II, V). Stress had an association with difficulties in social relationships, a higher level of education and a negative attitude towards the EU (I). Variables associated with 'at least three symptoms' were strenuousness of life or agricultural work, forestry as a production sector and a low number of years as a farm entrepreneur (II). In addition, the variable "over two weeks of pesticide usage during the previous growing period" was associated with 'at least three symptoms' (II). Earlier research publications have also informed about the link between mental symptoms and pesticide exposure.
3. Gradually built, a positive relationship and trust between the cattle and the stockperson (III) improves occupational safety among cattle handlers. In practice, this involves keeping physical conditions animal friendly, performing positive, predictable routines, habituating young calves to people, avoiding the separation of an individual animal, not dominating animals by force and being patient during work among farm animals. Finally, the handler should always be prepared for self-defence (III). During the change towards larger herds per farm and an increased use of cattle barn technology, it is important to emphasize methods to avoid animal stress and fear towards human beings (III). Animal handling is among the work tasks on farms with the greatest injury risk.
4. As a positive element, nearly all the study women (8) considered work with animals and close to nature to be rewarding, and the respondents were involved in a wide range of work tasks (IV). However, the women's working days were long. Old traditions may create invisible barriers to organizing the work in a more functional way on enlarged farm units. Most of the women chose farm entrepreneur as their professional title, but the professional position was often undefined or misunderstood. The valuable contribution of female farm entrepreneurs to agriculture should be recognized and supported, because women's expertise within agriculture is important in finding solutions for future challenges such as sustainable, organic agriculture and animal welfare (IV). According to literature references, important problems related to the well-being at work of female farmers are chronic diseases and lowered work ability.

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