Positive pressure tube ventilation
For calf barns

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Dairy barn built in 2011,
Separated compartment with separated individual ventilation for calves
Today we recommend dairy producers to build separate buildings for milking cows, calves and heifers

Reason: disease prevention
A calf barn - outside

A calf barn - inside
Simple and functional calf barn (expandable)

Positive pressure tube for blowing air into the barn

Positive pressure means slight over pressure, however it has no negative impact on constructions because air escapes freely through curtains, chimneys, doors etc.

Precision air blow flushes standing unclean air away from the boxes.
Tube system is applicable in old barns, too.
A new calf barn in Middle Finland
Where measurements were done

Air tubes

Single pens  Group pens
Planning tool = excel based programme

Designed by Dr. Ken Nordlund et al. – University of Wisconsin USA

Using the “Positive Pressure Tube Calculator, Version 5.0”
to design positive pressure tube ventilation systems for calf barns

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INTRODUCTION

This paper supports the Excel spreadsheet “Positive Pressure Tube Calculator, Version 5.0.” Developed in 2011 and modified in 2012, the spreadsheet is used in the design of new positive pressure tube systems for calf barns. It can also be useful for the analysis of the performance of existing systems. The calculator is also useful for the design of tube systems for use in heifer and adult cattle environments, providing heat abatement and ventilation with fresh air. The scope of this paper will focus on the design of calf barn systems, followed by a discussion on the analysis of existing systems.
First measurement, curtains open

North facade

Second measurement, curtains closed

North facade

Air speed at the inlets

4 m/s

3 - 4 m/s

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Air speed at the outlet holes

5-7 m/s

0-1 m/s

0.5 m/s

0.2 m/s

45 mm / 40 cm

35 mm / 30 cm
Second measurement, curtains closed

Outdoor temp + 24 C

Wind direction

tuulen tulo-suunta

Positive pressure tube ventilation performance

Spatial volume is 1020 m³ (15 x 20 x 3.4 m)
Blown air quantity is 1900 m³ per hour
This is equivalent to 1.9 (2) changes per hour
No harmful draught on animal level

This can be considered as sufficient basic ventilation rate!
When the target is to flush the boxes at animal level!
(in winter, curtains closed)
(in summer, no wind)
Typical outdoor and indoor temperatures (hour by hour) in natural ventilated curtain barn for 120 dairy cows in Finland
(measurements and simulation 2011 by VTT & MTT)

Air exchange rate and outdoor temperature in naturally ventilated dairy barn with curtains
(measurements and simulation 2011 by VTT & MTT)
Fresh air!

We’ll love it!