

Tube ventilation systems for optimizing stable climate in calf barns

Session 4. Research on young stock care:
the journey of calves from gestation onwards

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Introduction

- **Restricted thermoneutral behaviour** of calves and young stock
- Many problems on farms with loss of vitality and health
 - Heat stress in summer, cold stress and draughts in winter, bad air quality
 - Tube ventilation systems with inadequacies...

**We need a year-round, safe and optimised ventilation of barns
with sufficient fresh air to fullfill the special needs of calves!**

They are the FUTURE...

Research questions

1. What are the effects of tube ventilation systems on **air quality and airflow** in the calf environment?
2. Are there **physiological changes** when using tubes?
3. What conditions are necessary for the **year-round use** of tubes in calf and young stock barns?



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Methods

- 2021 build barn for 45 calves and young stock
- 1,060 metres above sea level
- **2 vet.smart.tubes with FNo35 and FNo45-EC fans**
- **UNIcon-controlled** (Ziehl-Abegg)
- Fresh air from west for calves
- Fresh air from east for young stock

Barn for 45 calves and young stock
(FV x RF)

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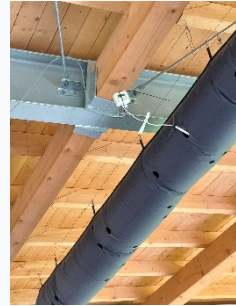


Methods

- Summer measurement from **23.07. to 05.09.2022**
- Winter measurement from **13.01. to 17.03.2023**

Measuring parametres:

- **Temperature, relative humidity and velocity** (outside, inside the tube and in the surroundings of calves/young stock) every 10 minutes
- **Noxious gases** (NH_3 , CO_2 , H_2S) multi-day measurement series/punctual
- **Daily drinking quantity** and abnormalities in health status



Management for consistently high vitality

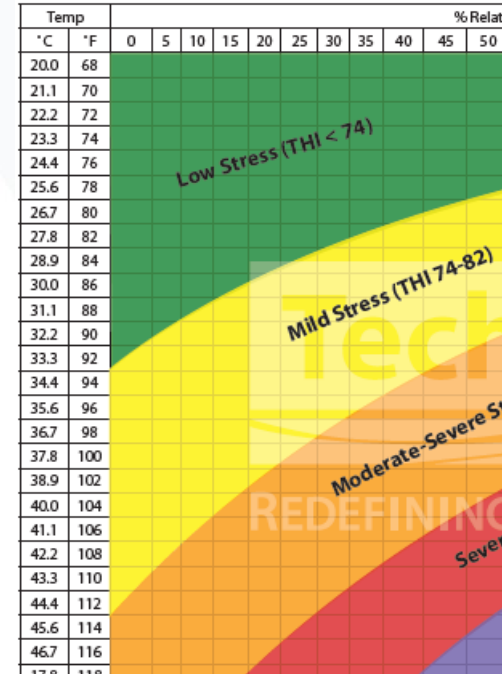
- **Tranching** after birth (colostrum) and in case of drinking loss tranching with electrolytes
- **High amount of whole milk**, water and calf muesli
- Removal of manure and renewing bedding (**Nesting score 3**) 1x/week
- **Watercleaning** of all boxes every third week
- **Covering the lying area** for very young calves in the cold season



Best care for calves
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Tab.: Daily milk supply

Week	1-3	3-7	8-14	14-16
Milk in l/d	14-10	10-8	8-6	6-4



Streaming attitude inside the tube

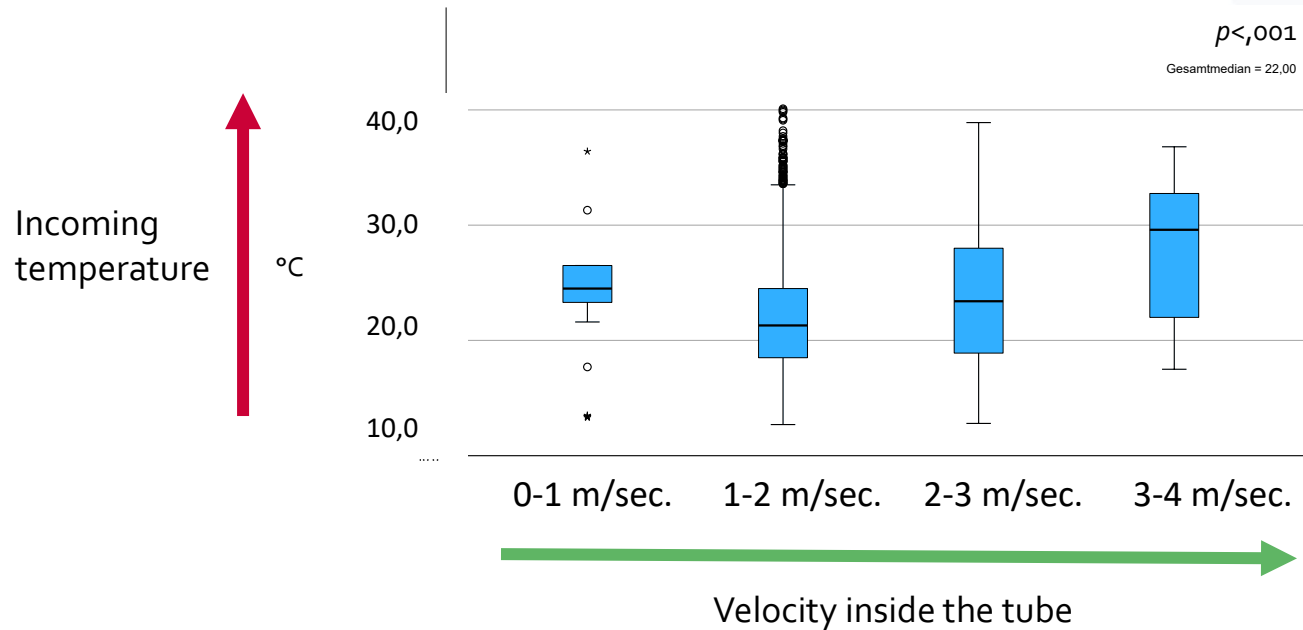


Fig.: Streaming attitude inside the tube in consideration of the incoming temperature

Results winter

Contrary expectations: Calves coped very well despite low temperatures!

- *Minimum* = minus 13.10 °C in the supply air ($M=0.91$ °C)
minus 7.70 °C in the calf environment ($M=3.18$ °C)
- Constant air circulation = $M=0.59$ m/sec. inside the tube
 $M=0.23$ m/sec. in the barn
- Optimized relative humidity = $M=72.27$ % outside, $p<.001$
 $M=61.95$ % around calves
- Almost **0 ppm ammonia** and low carbon oxide in the barn despite closed curtains



Discussion

- Despite velocity above 0.2 m/sec. no dangerous draught in winter!
- During the entire period (8 months) **only one calf fell ill** (*lung disease in 03/2023*)
- Health of calves positive influenced by best management!
- Question of hygiene and cleaning is not important at all by using tubes year-round! (Requirement: **NO AIR from areas with manure, slurry,...**)

Optimizations for year-round-use: conditioning the incoming air - if best management cannot be take sure!



Tube ventilation system
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Conclusion

- Tubes and climate computer as combination for **hygienic and well-ventilated calf environment** and **avoid of draught** because of **well-fitted tubes**
- **Best air quality** with low ammonia and a maximum of 822 ppm carbon oxide
- **No physiological changes and loss of drinking quantity** at hot times

In cooperation with the Austrian Centre for Animal Husbandry and Animal Welfare the tested **tube ventilation system can be recommended for calves** under **clearly specified installation and operating conditions**.

**Many thanks
for your
attention!**



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