



# Management of calves from birth to weaning

**Focus: Calf rearing in countries from three different continents**

A DISARM and IDF Webinar



Disseminating Innovative  
Solutions for Antibiotic  
Resistance Management



This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 817591



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Disseminating Innovative  
Solutions for Antibiotic  
Resistance Management



INTERNATIONAL DAIRY FEDERATION

70/B, Boulevard Auguste Reyers

1030 Brussels - Belgium

Tel: +32 2 325 67 40

Email: info@fil-idf.org

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Coordinated by

Partners



ILVO

Flanders research institute for  
agriculture, fisheries and food

# OUR SPEAKERS AND OUTLINE



Individual and group rearing systems used for calves from birth through weaning in the US

**DR JENNIFER VAN OS**  
**UNIVERSITY OF WISCONSIN,**  
**UNITED STATES**



Prewaning calf management-results from a Norwegian survey

**DR JULIE FØSKE**  
**NORWEGIAN VETERINARY**  
**INSTITUTE, NORWAY**



Calf rearing systems in China

**MR SNORRI SIGURDSSON**  
**CHINA-DENMARK MILK**  
**TECHNOLOGY COOPERATION**  
**CENTRE**



Questions and answers and Conclusions

**DR KERSTIN BARTH**  
**GERMAN THÜNEN INSTITUTE OF**  
**ORGANIC FARMING**  
**IDF ACTION TEAM LEADER ON**  
**CALF MANAGEMENT**



**QUESTIONS & ANSWERS ON ZOOM CHAT**



## Individual and group rearing systems used for calves from birth through weaning in the US

**Jennifer Van Os**

Assistant Professor

Extension Specialist in Animal Welfare



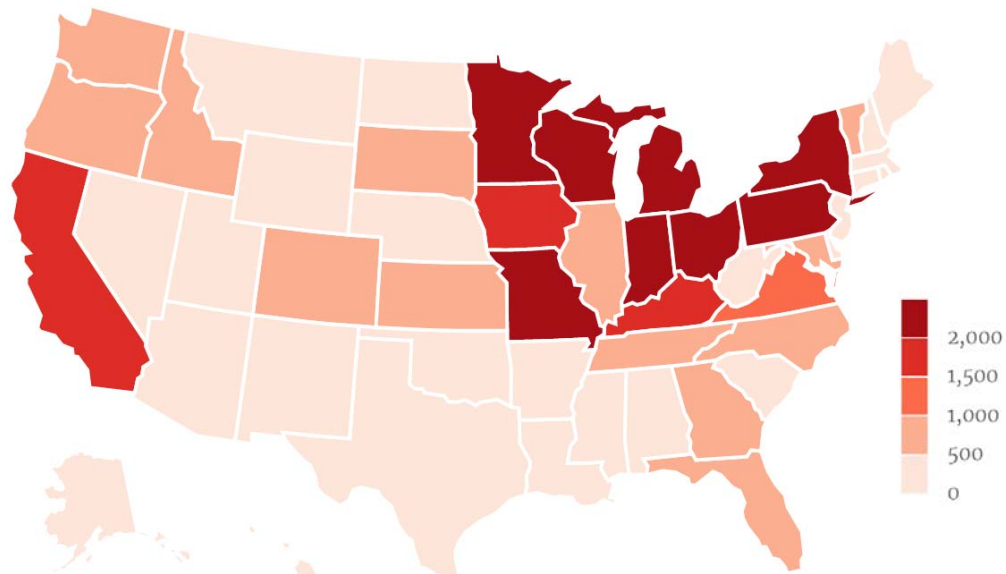
Department of  
Animal & Dairy Sciences  
UNIVERSITY OF WISCONSIN-MADISON

*IDF Webinar on management of calves from birth to weaning;  
Focus: calf rearing in countries from three different continents  
October 27, 2020*

## Outline

1. Context: pre-weaned calf rearing in the U.S.
2. Health and welfare considerations
3. Housing
4. Milk feeding

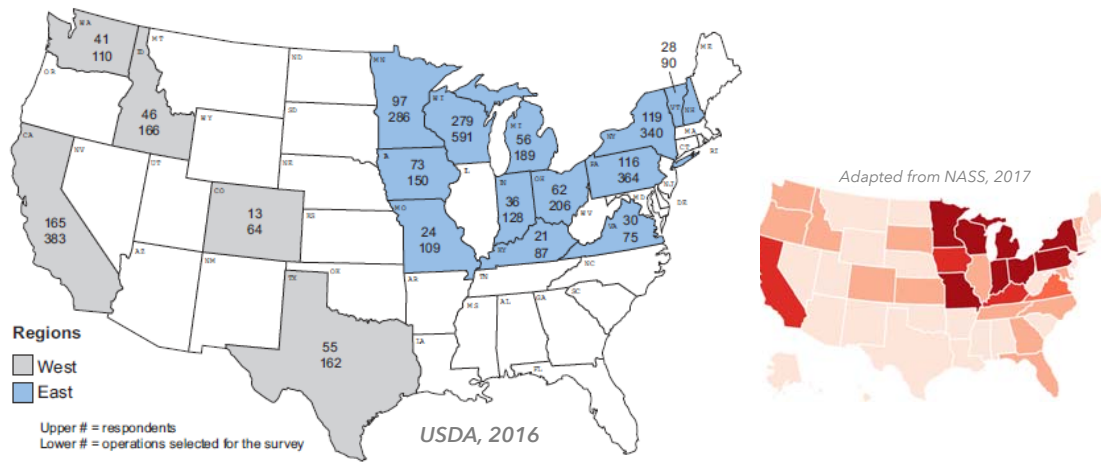
## Dairy farms in the U.S. by state



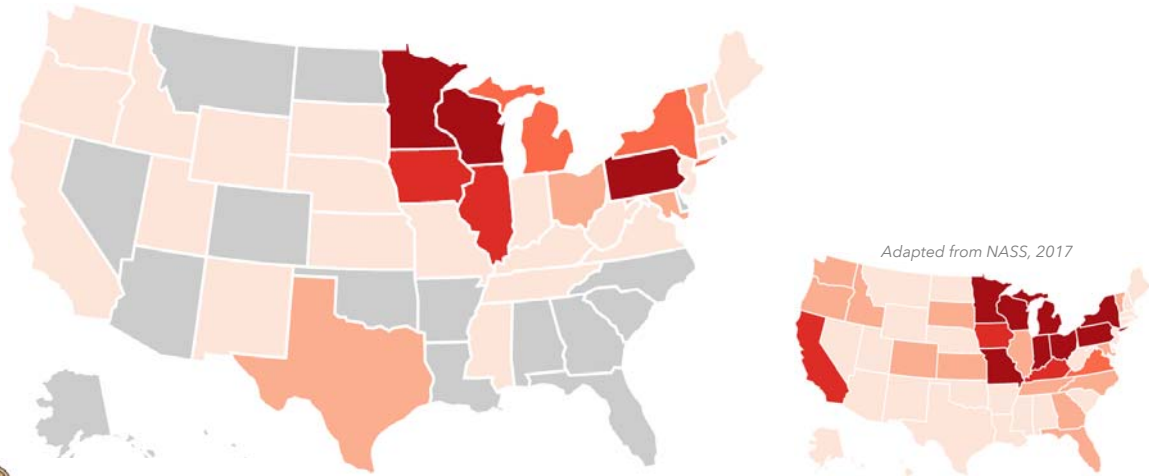
Adapted from NASS, 2017, created using [www.mapinseconds.com](http://www.mapinseconds.com)

## United States Department of Agriculture report on dairy management practices in 2014

### NAHMS Dairy 2014 Participating States



## 2019 survey: 413 dairy producers & calf raisers

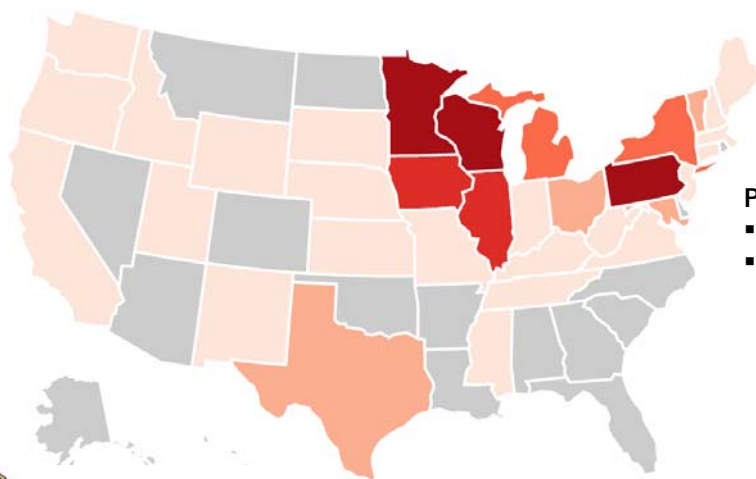


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*Adapted from NASS, 2017*

*Silva, Van Os, et al., in preparation*

## 2019 survey: 413 dairy producers & calf raisers



### Pre-weaned heifers (mean, range)

- Dairy farms: 187 (1 to 24,000)
- Calf ranches: 4,511 (1 to 81,847)



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*Silva, Van Os, et al., in preparation*

## Most heifers are raised on the source dairy farm

- Overall, 92% of dairy farms raise at least some heifers on site, and 65% raise all of their heifers on site
  - 73% of all heifer calves are raised on site
- 46% of large farms ( $\geq 500$  cows) outsource heifer rearing
  - For large farms, 63% of the heifers raised off site are sent to the rearing facility before weaning (avg. 7 days old)
  - For farms with  $< 500$  cows, the majority of heifers sent off site are already weaned

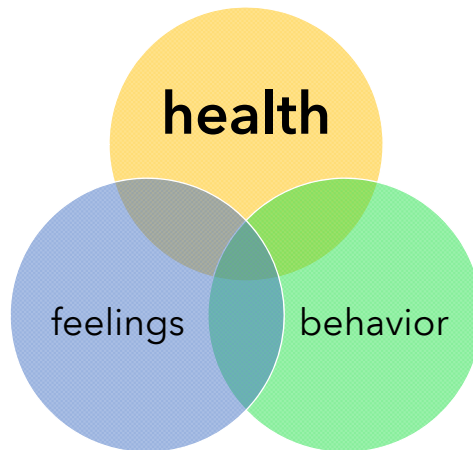
USDA, 2016

## Outline

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## Traditional focus: health, growth, productivity



*Fraser et al. 1997. Anim. Welf. 6:187-205*

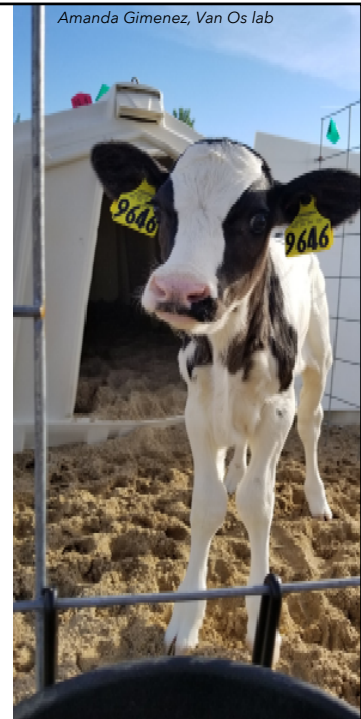
## Calf mortality rates have improved

- Overall pre-weaning mortality (excluding stillbirths, <48 h after birth) ~6%, down from 11% compared to 20 years earlier
  - In part, due to improvements in colostrum practices
  - On average, colostrum fed 3.6 hours after birth
- Highest mortality rates within the first 3 weeks of life

*Urie et al., 2018; USDA, 2016, 2018*

## Why is single housing the norm?

- Physical separating can reduce disease risks:
  - ↓ calf-to-calf contact
  - ↓ shared aerosol
  - ↓ contamination of shared feeding equipment or bedding
- Allows for controlling & monitoring individual feeding
- Ease of handling individual calves



## Calf morbidity rates are still high

- Overall pre-weaning morbidity = 33%
  - Primarily digestive or respiratory causes
  - Only slight decrease from 20 years earlier...

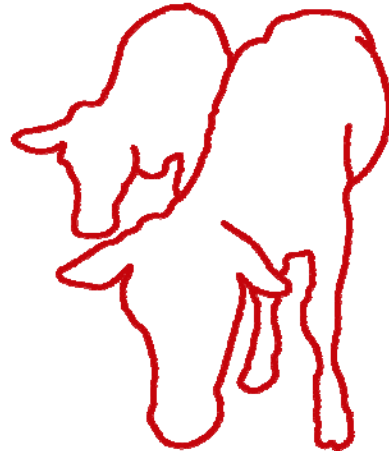
*... and what about other aspects of welfare besides health?*



Urie et al., 2018; USDA, 2018

## Social rearing gaining attention due to many benefits:

- ✓ Social development
- ✓ Play behavior
- ✓ Cognitive / behavioral flexibility
- ✓ Adaptability to new things
- ✓ Resilience to stress
- ✓ Higher solid feed intake
- ✓ Higher weight gains
- ✓ Greater public acceptance



See review by Costa et al., 2016; Broom & Leaver, 1978; Costa et al., 2014; De Paula Vieira et al., 2010; Gaillard et al., 2014; Jensen et al., 1997, 1998, 2015; Meagher et al., 2015; Perttu et al., 2020; Veissier et al., 1994, 1997

## Multiple factors contribute to calf morbidity

The same principles for good health apply to individuals or groups:

- ✓ sanitation + biosecurity
- ✓ all-in / all-out moves
- ✓ space allowance, bedding
- ✓ ventilation
- ✓ colostrum protocol
- ✓ nutrition

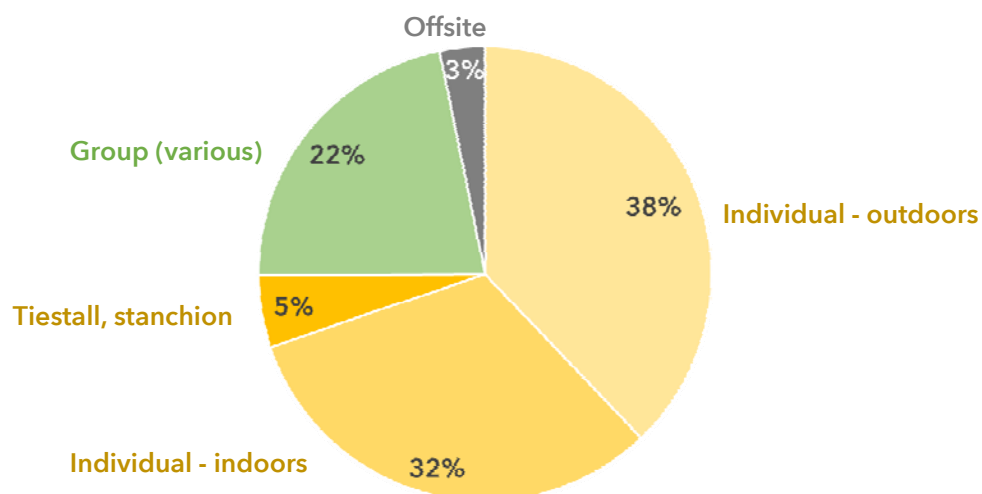
Many farms successfully raise healthy calves in social groups, although other farms may need to adjust management practices before transitioning from individual housing

Costa et al. 2016. J. Dairy Sci. 99:2453-2467; Ollivett, 2020. Vet. Clin. Food Anim. 36:385-398

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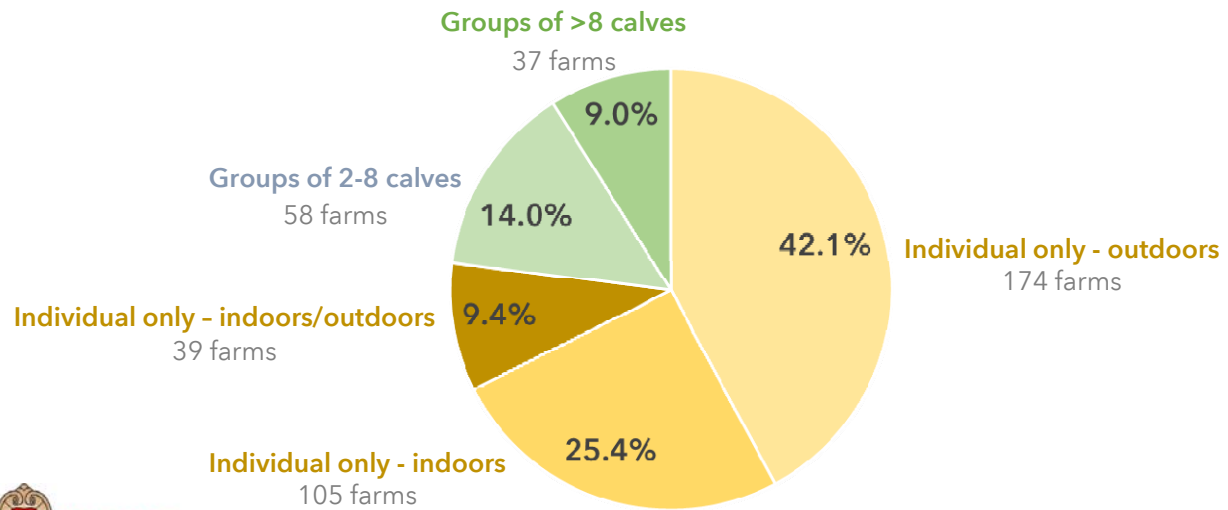
### USDA: 75% of dairy farms house calves without full social contact



USDA, 2016



## 77% of surveyed farms individually house only



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*Silva, Van Os, et al., in preparation*

Photo: Dairy Herd



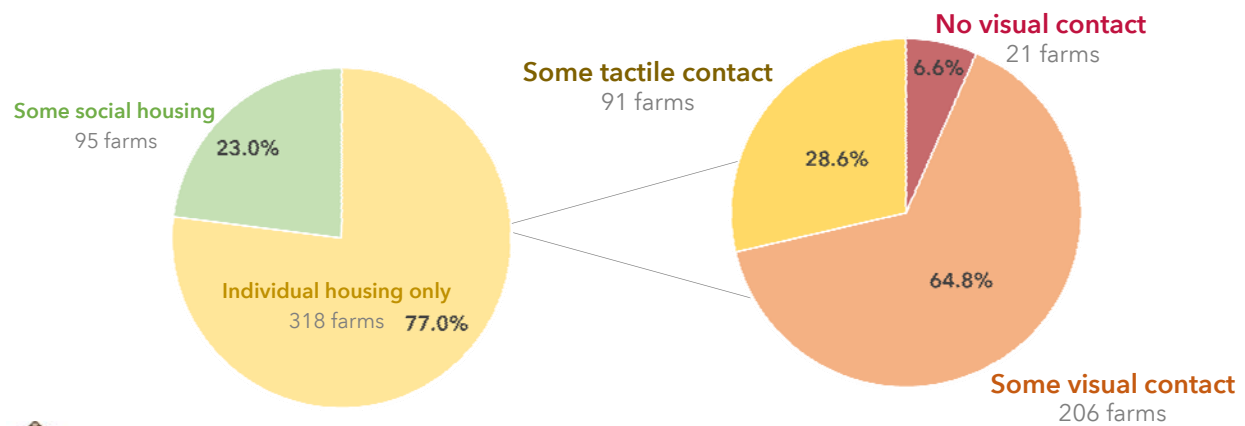
Photo: Hoard's Dairyman

Photo: Progressive Dairy

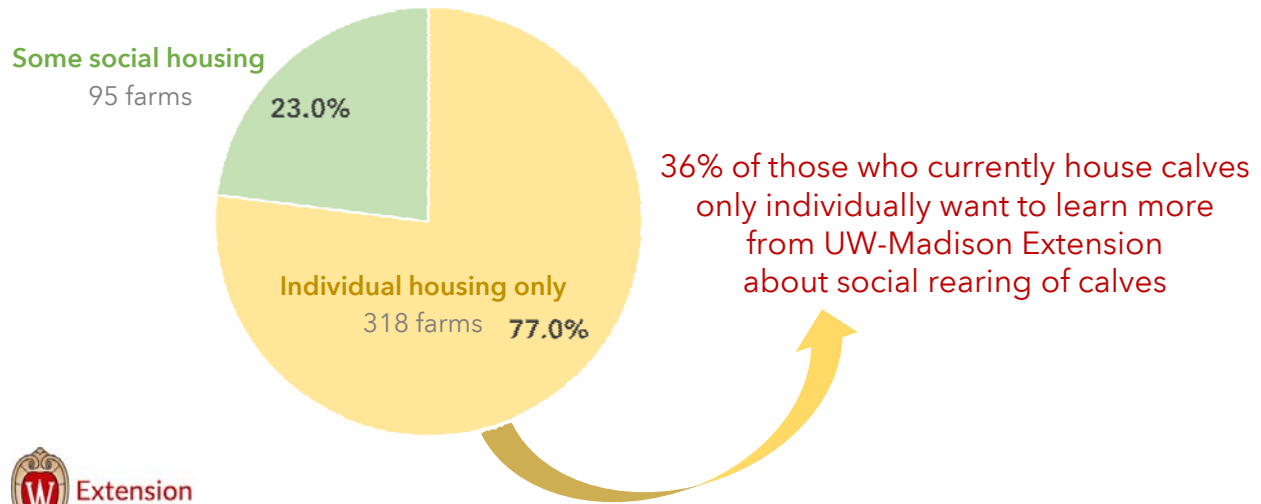




## 93% of farms using only individual housing allow at least visual contact among calves

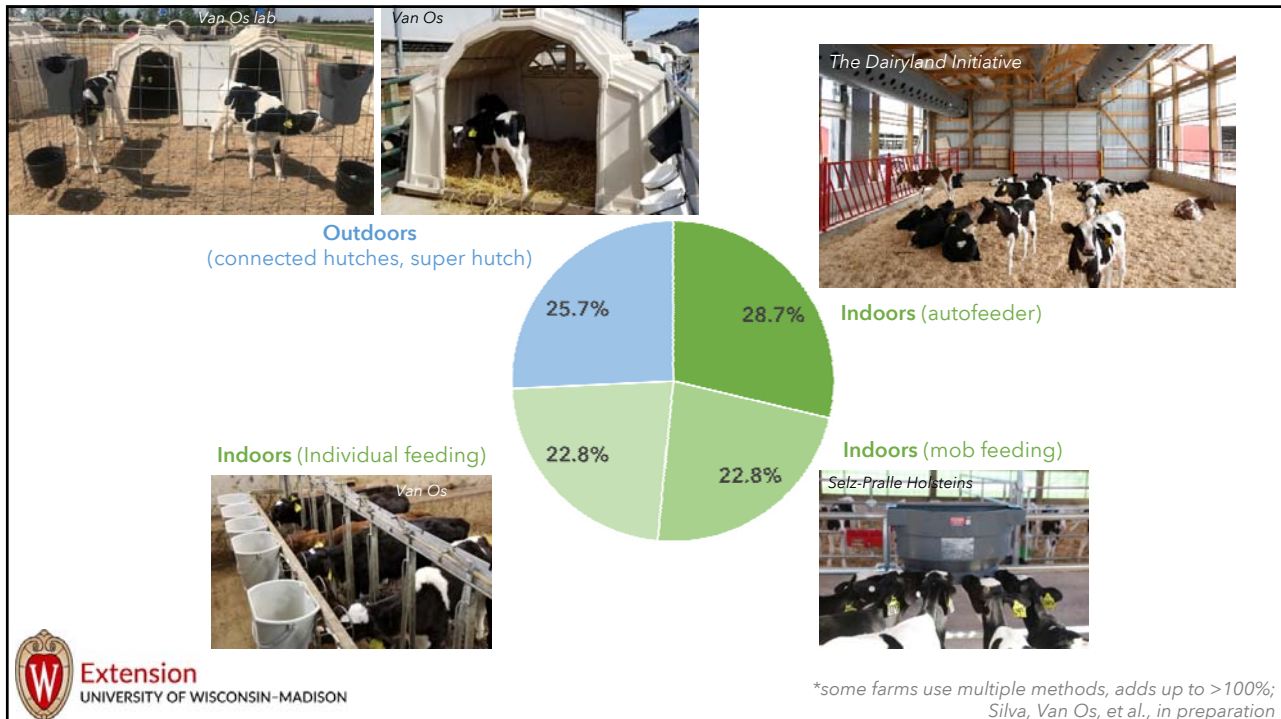


## Many producers are interested in social rearing



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## Pair housing in hutches can be done at scale



*Salter, Reuscher, Van Os (submitted); Whalin et al. 2018; Wormsbecher et al. 2017; Pempek et al. 2013*

## Space allowance

- No federal regulations
- Industry programs (e.g., FARM) do not currently have standards for specific space requirements
- California law (following 2018 ballot proposition 12):  
 $\geq 43$  sq ft ( $4 \text{ m}^2$ ) of usable floor space per **veal calf**
- Educational resources suggest  $\geq 30$  or  $35$  sq ft ( $2.8$  or  $3.3 \text{ m}^2$ ) of resting space per calf

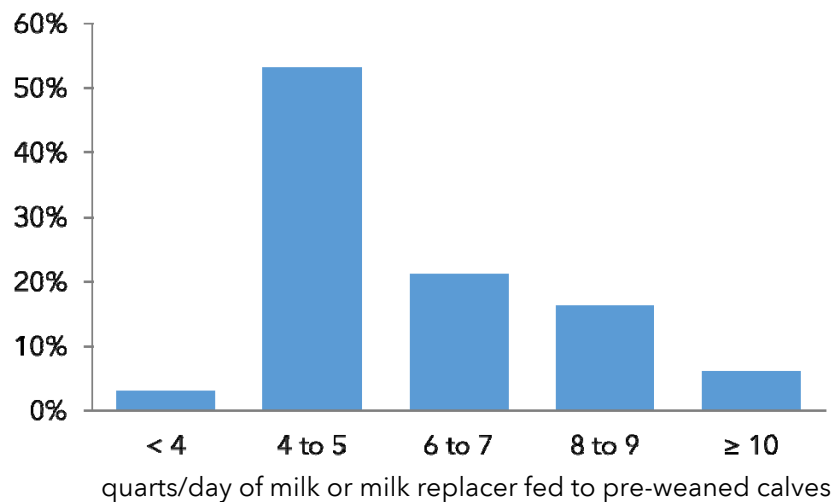
*The Dairyland Initiative (thedairylandinitiative.vetmed.wisc.edu); Dairy Calf & Heifer Association Gold*



## Outline

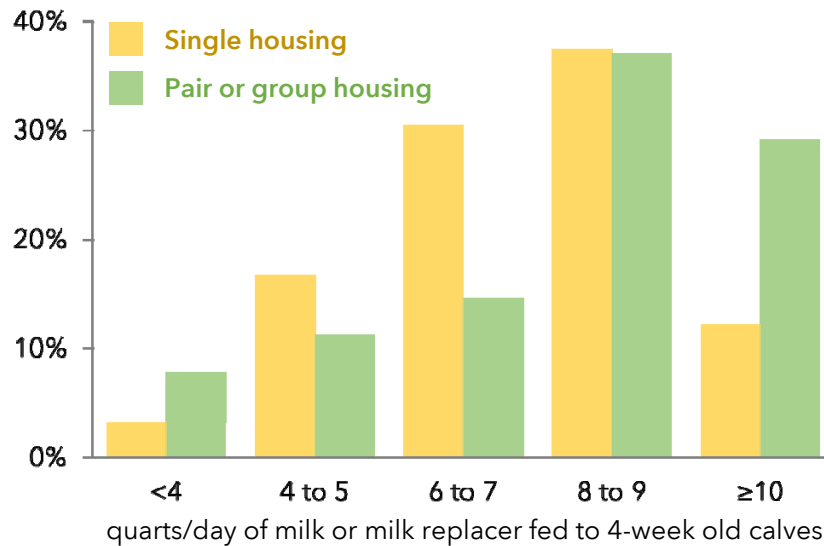
1. Context: pre-weaned calf rearing in the U.S.
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**USDA: half of farms feed  $\leq 5$  quarts per day,  
and only 22% feed  $\geq 8$  quarts (7.6 L)**



USDA, 2016

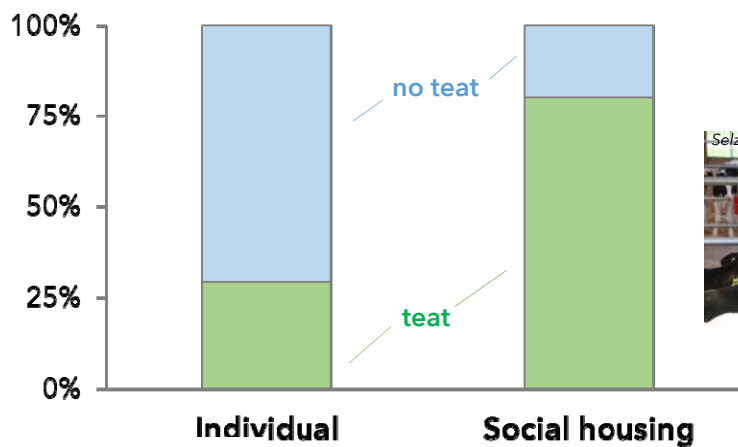
## In our survey, most farms fed $\geq 8$ quarts per day



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Silva, Van Os, et al., in preparation

## 80% of farms using social housing fed milk through a teat instead of a bucket or trough



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Silva, Van Os, et al., in preparation

## Summary

- U.S. farms vary greatly in herd size and calf-housing systems
  - there is no single "typical" farm type
- Individual housing is the norm in the U.S., in part due to traditional focus on calf health
- However, in the last 20 years, although mortality has decreased, morbidity remains at ~1/3 of calves
- The norm is moving toward feeding greater milk or replacer allowances, but bucket feeding remains popular
- Interest in social housing is growing

## Conclusions: U.S. calf health & welfare

- In the last 2 decades, improvements have been made in some aspects of calf health
- Opportunities remain to improve health and welfare, including social, environmental, and feeding complexity
- Interest is growing in social housing, addressing important aspects of calf welfare, development, and performance

**Jennifer Van Os**

jvanos@wisc.edu

[www.DairyAnimalWelfare.org](http://www.DairyAnimalWelfare.org)



@AWSUWM

(Animal Welfare Science at UW-Madison)



Department of  
Animal & Dairy Sciences  
UNIVERSITY OF WISCONSIN-MADISON

*Thank you to NMPF and the FARM Animal Care Program for the invitation to present*





Veterinærinstituttet  
Norwegian Veterinary Institute

# Preweaning calf management- results from a Norwegian survey

Tuesday, October 27, 2020

IDF Webinar on Management of calves from birth to weaning

Julie Føske Johnsen, Norwegian Veterinary Institute





# Background

- New knowledge on calves' needs:
  - Restricted milk allowances -> hunger, low growth, poor welfare
  - Benefits of social housing
- How are calves fed and housed in Norwegian herds?
- Do herds comply to legislation on calf welfare?
- Is there an association between calf management, compliance to current legislation and herd dairy calf mortality?







Veterinærinstituttet  
Norwegian Veterinary Institute

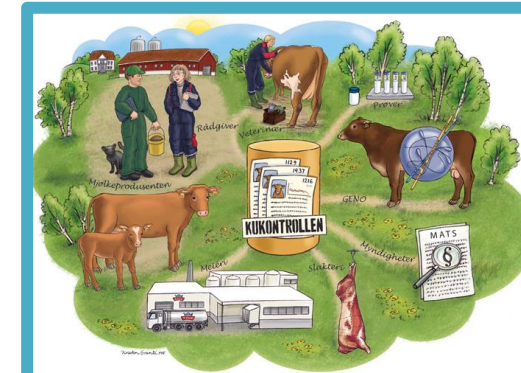
# Material and methods



912 dairy herds  
Calf welfare inspection

1) My calves aged appr. 3 weeks usually receive	
• x	L milk/d divided on x meals
2) Have you changed the milk allowance considerably during the last 4 years?	
• no x	yes, former milk allowance was y L /day
3) Milk replacer	
• is not used x	
• is used from y	weeks
4) Water	
• Do your calves aged appr. 3 weeks usually have free access to water?	
Yes x	No y
5) For how many weeks is the calf housed in a single pen?	
• x	weeks
6) Barn type	
• Freestall	Tiestall

508 (56%) herds responded to a short questionnaire



431 herds matched  
with health  
data from  
Norwegian Dairy  
Cattle Health  
Services

11 criteria (e.g. calf  
housing, feeding)  
evaluated  
according to compliance  
to current legislation

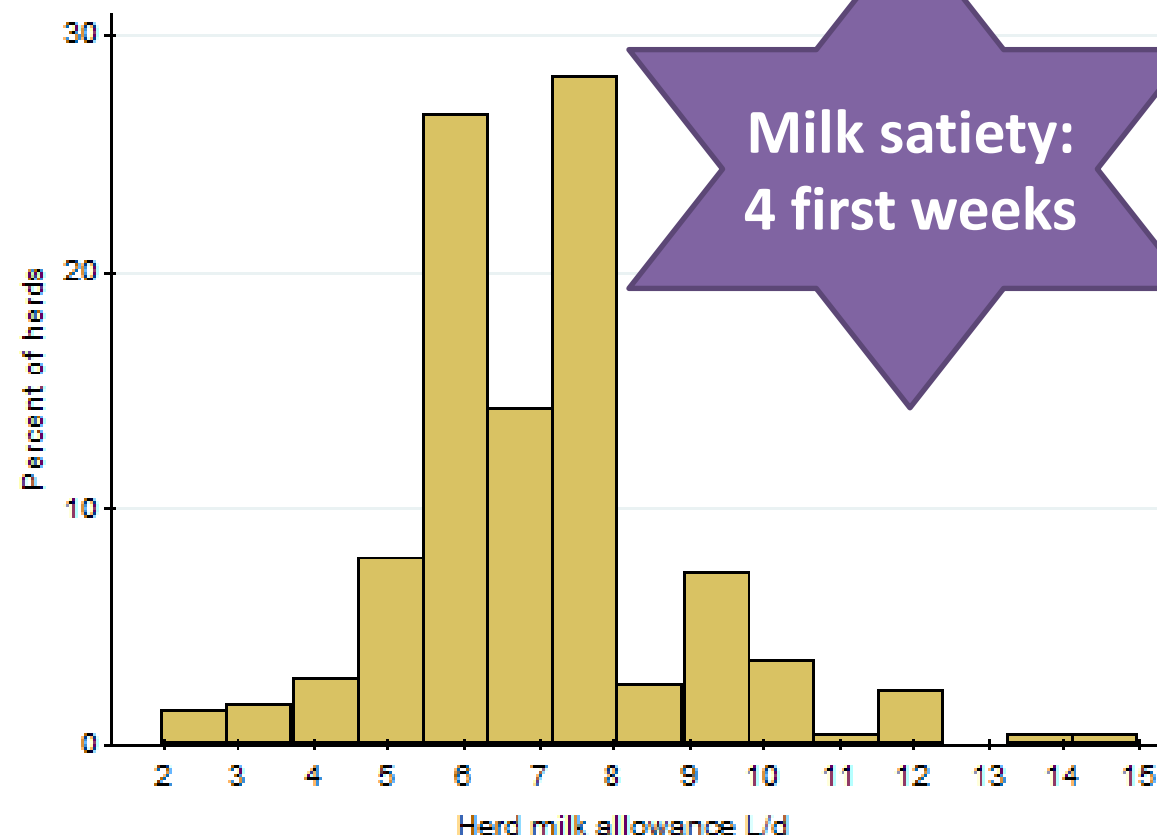
**Aim: Describe housing and feeding of young dairy calves**  
**Aim: Investigate associations between calf  
management, compliance to welfare  
legislation and calf mortality**

Calf mortality and disease  
treatments  
i 2016

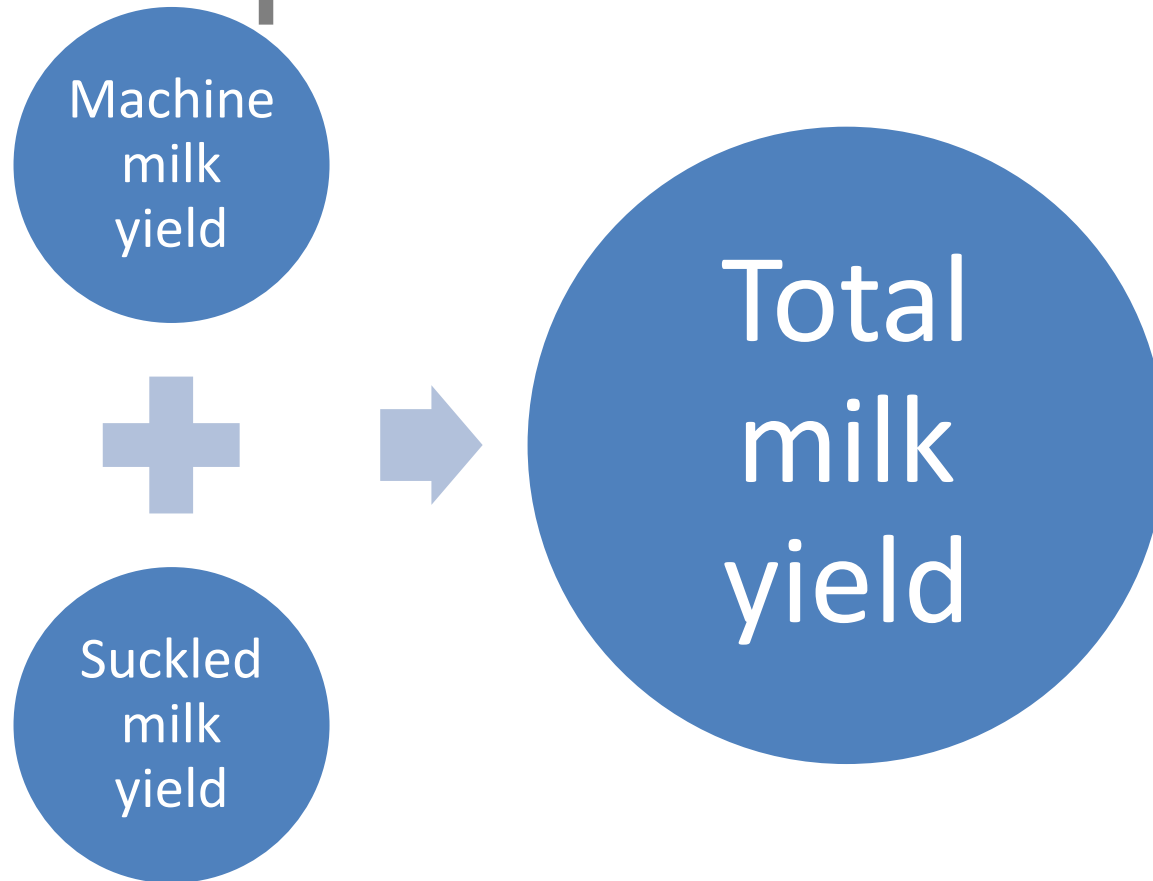


# Results-daily milk allowance to 3 week old calves

- Median milk allowance: 7 L/d
- 311 herds (61%) feed < 8 L/d
- 76 herds (15%) feed < 6 L/d
- 17 herds (3%) feed < 4 L/d



# Calf needs, cow needs and dairy production- a compromise?





# Results-feeding frequency

- 3 wk old calves are fed 3 times/d
- Most herds (47%) feed twice daily
- 56 herds (12%) feed 4 times/d
- Automatic milk feeder is used in 29 herds
- 226 herds (46%) use milk replacer-  
from the age of 2 weeks







# Housing and water access

## Housing

- Calves are housed in single pens for 2 wks (range 0-16)

## Water access

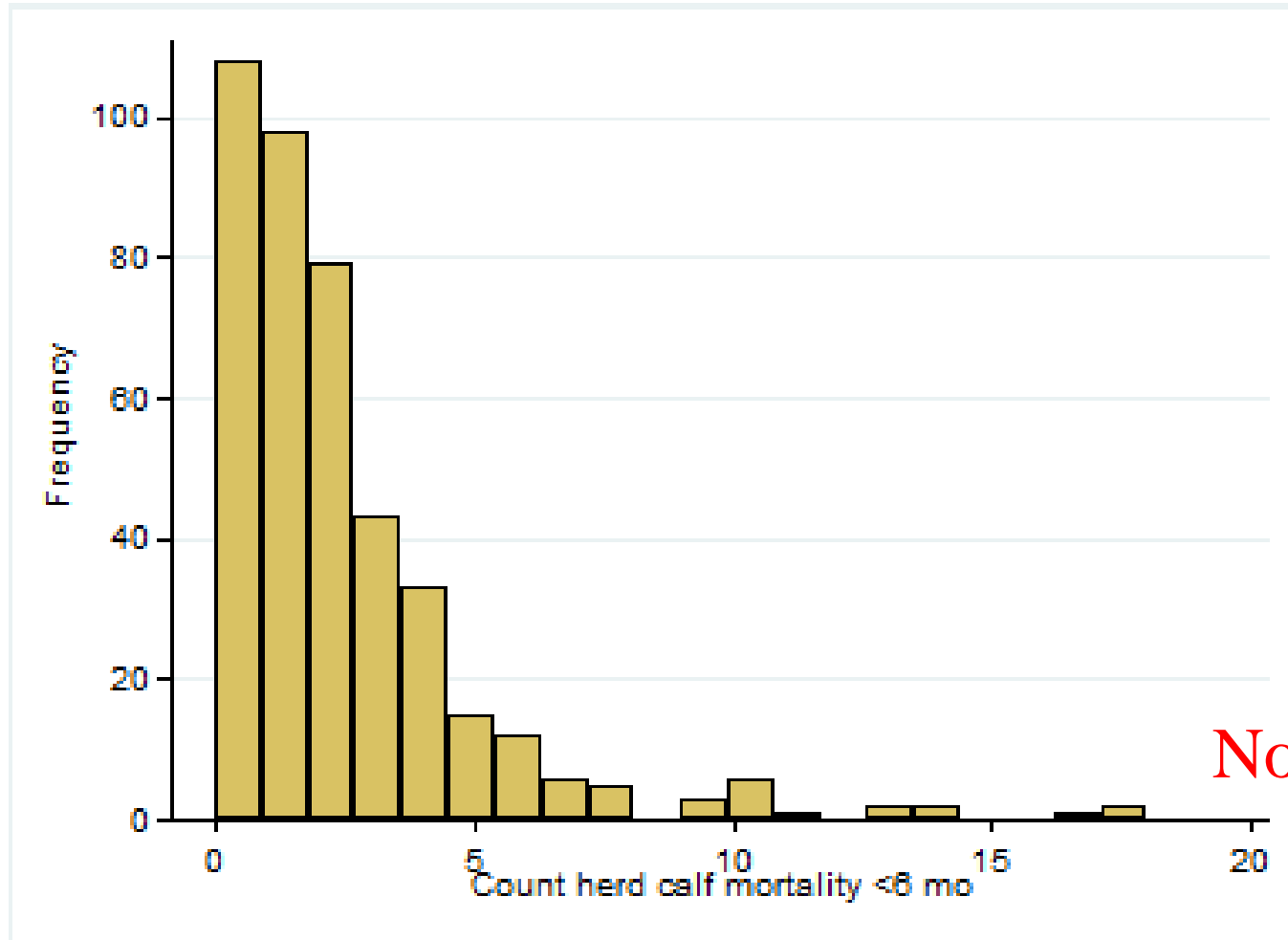
- 82 (16%) herds: 3 wk old calves do not have free water access







# Calf mortality



- 25.9% of the herds had no registrations of calf mortality during 2016
- Median calf mortality rate was 6.4%
- No associations with milk feeding management or compliance to welfare legislation

No access to water at the age of 3 wk

Calf disease treatment events



# Summing up..

- Room for improvement: **more milk and water** to young dairy calves
- **Increased calf growth is economically viable!**
- Calf disease treatments-> risk assessments?



Foto: Maren Sætervik Rognskog

# Thank you for your attention...



A cross-sectional study of associations between herd-level calf mortality rates, compliance with legislation on calf welfare and milk feeding management in Norwegian dairy herds. J. F. Johnsen, I. H. Holmøy, C. M. Mejdell, K. Ellingsen-Dalskau, O. Østerås A., Døsen, E. Skjerve and A. Nødtvedt. Accepted for publication. Journal of Dairy Science

[Julie.johnsen@vetinst.no](mailto:Julie.johnsen@vetinst.no)



**Veterinærinstituttet**  
Norwegian Veterinary Institute

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# Calf Rearing Systems In China

- from birth to weaning

Snorri Sigurdsson

Head of CDMTCC

Expert in Dairy Farm Management

E-mail: [snorri.sigurdsson@arlafoods.com](mailto:snorri.sigurdsson@arlafoods.com)

WeChat ID: Snorri-Sigurdsson



# Snorri Sigurdsson & CDMTCC

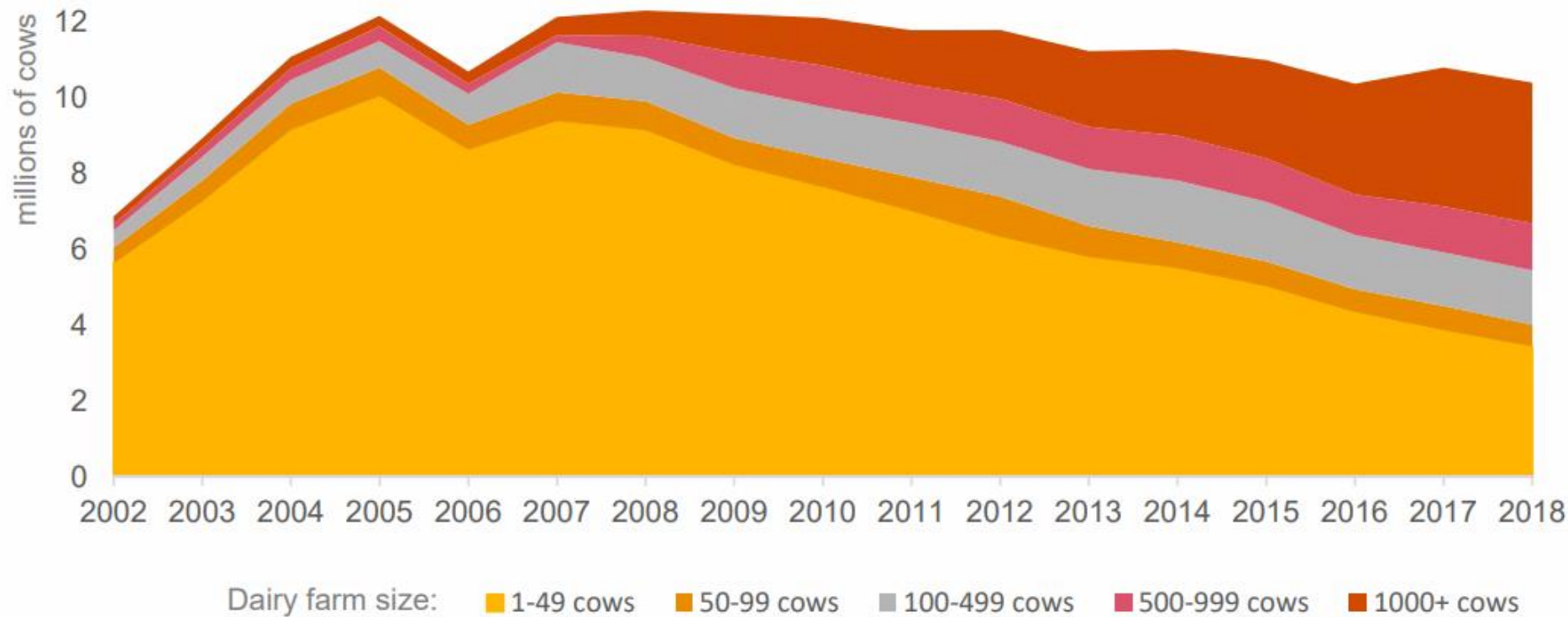
- ▶ Head of China-Denmark Milk Technology Cooperation Centre (CDMTCC)
  - ▶ 25 years experience with dairy farming, mainly farm improvement
  - ▶ Done farm improvement inspections in 22 different countries
  - ▶ Helped over 2.400 dairy farmers around the world to improve the farm output, production and productivity.
- ▶ CDMTCC is a joint venture between European company Arla Foods and Mengniu
- ▶ Purpose to broaden knowhow in milk production, reduce production cost of milk, improve animal welfare and focus on environmental issues

# Chinese Dairy Farming Industry

- ▶ Many big companies with tens of thousands of cows and many farms each
- ▶ Still many dairy farms with few cows:
  - ▶ average in 2018 was 16 cows
  - ▶ 662 thousand farms
- ▶ However the average size of farms selling milk to Mengniu has close to 1.000 COWS
- ▶ Number of dairy farms reduced drastically, by 75% since 2007
- ▶ Milk production now at about 33 billion kg.
  - ▶ growing with 4-5% yearly

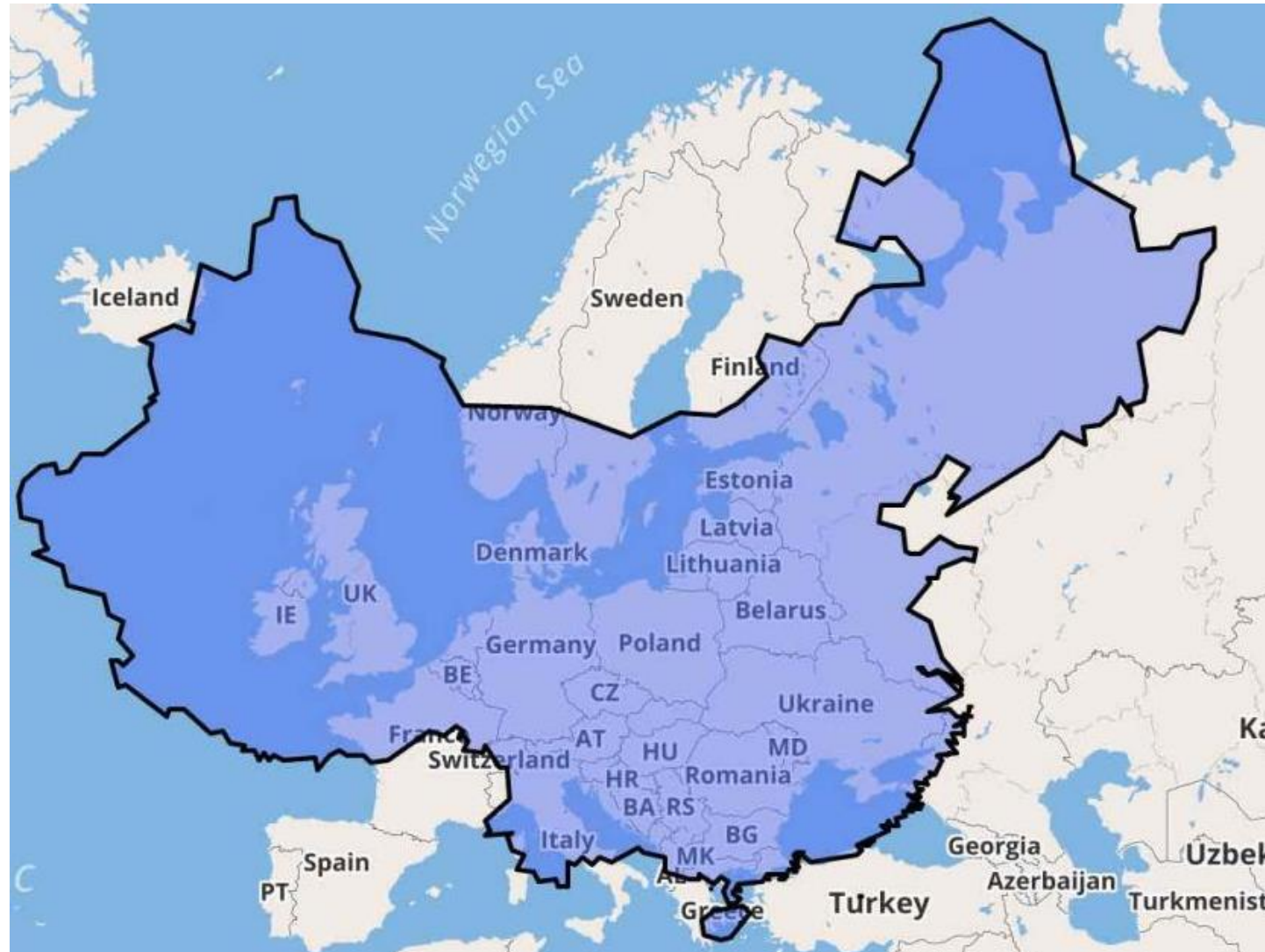


China's dairy herd shrunk by nearly 20% between 2008 and 2018, but the percentage of cows on farms with more than 100 cows increased from 20% to over 60%



# How do farmers take care of calves in Europe?

- China is huge!





Rapid  
Transformation  
of the Chinese  
Dairy Farming in  
only few years

















# Calving



Still space for  
improvement  
(plastic floor)



# Colostrum & milk pasteurization

- Colostrum bank at majority of farms (if not all)







Hutches most commonly used

- Sometimes all milk feeding period

Limited but still being built in some areas





# Inside, different methods used



- Both in groups and single boxes

- Full bedding or partly concrete







## Bedding

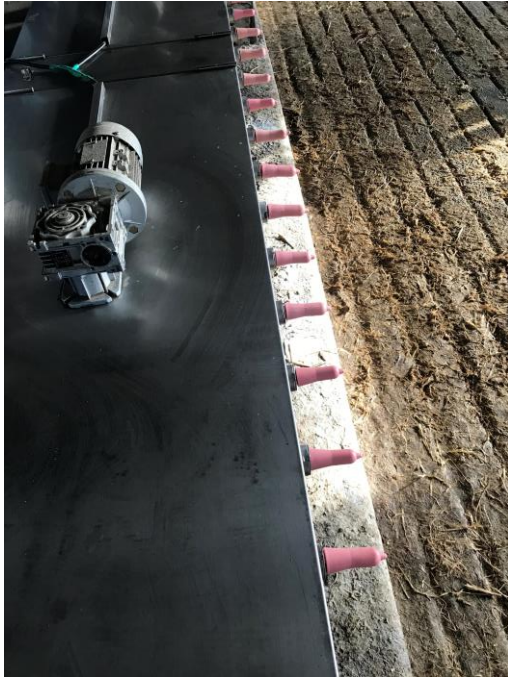
- ▶ Sand
- ▶ Straw
- ▶ Rice shells
- ▶ Timber
- ▶ Plastic



# Milk Feeding Methods

- ▶ Buckets
- ▶ Milk bars
- ▶ Automatic milk feeding rare





Feeding acidified milk quite common



Water and concentrates always +  
hay/straw rarely







Ventilation in  
group housing:  
Overpressure



Heat & sun problems  
- cooled heifers grow faster!







Shadow reduced sunlight impact outside





We also emphasize that feed gets protected from the sun

# Don't farm blindly - use KPI's

Weight	Colostrum	Register
<p>Register birth and weaning weight</p> <ul style="list-style-type: none"><li>• KPI target is 950-1050 grams/day with todays Holstein heifers</li></ul>	<p>Know IGG in the Colostrum and keep colostrum bank</p> <ul style="list-style-type: none"><li>• KPI target is &gt;25 IGG and preferably &gt;28 IGG</li></ul>	<p>Keep track on problems and use registration</p>

## Other KPI's often used in China:

- Calf mortality rate (24 h to weaning): < 2,5%
- Target for weaning: 55 days
- Lung disease:  $\leq 2,0\%$
- Diarrhea:  $\leq 5,0\%$
- Other diseases:  $\leq 3,0\%$





It is easy to weigh the heifers - gives fundamental information for the farm

# Main challenges in calf rearing in China?

- ▶ Lack of understanding of biosecurity - need of education
  - ▶ Lung problems
  - ▶ Diarrhea
- ▶ Heat / sun
- ▶ Still many that do not reach 800 grams/day in growth
- ▶ Too many use milk from antibiotic treated cows for the calves

Reports & monthly newsletter on:

[www.cdmtcc.org](http://www.cdmtcc.org)

Thank you ! 谢谢 !



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