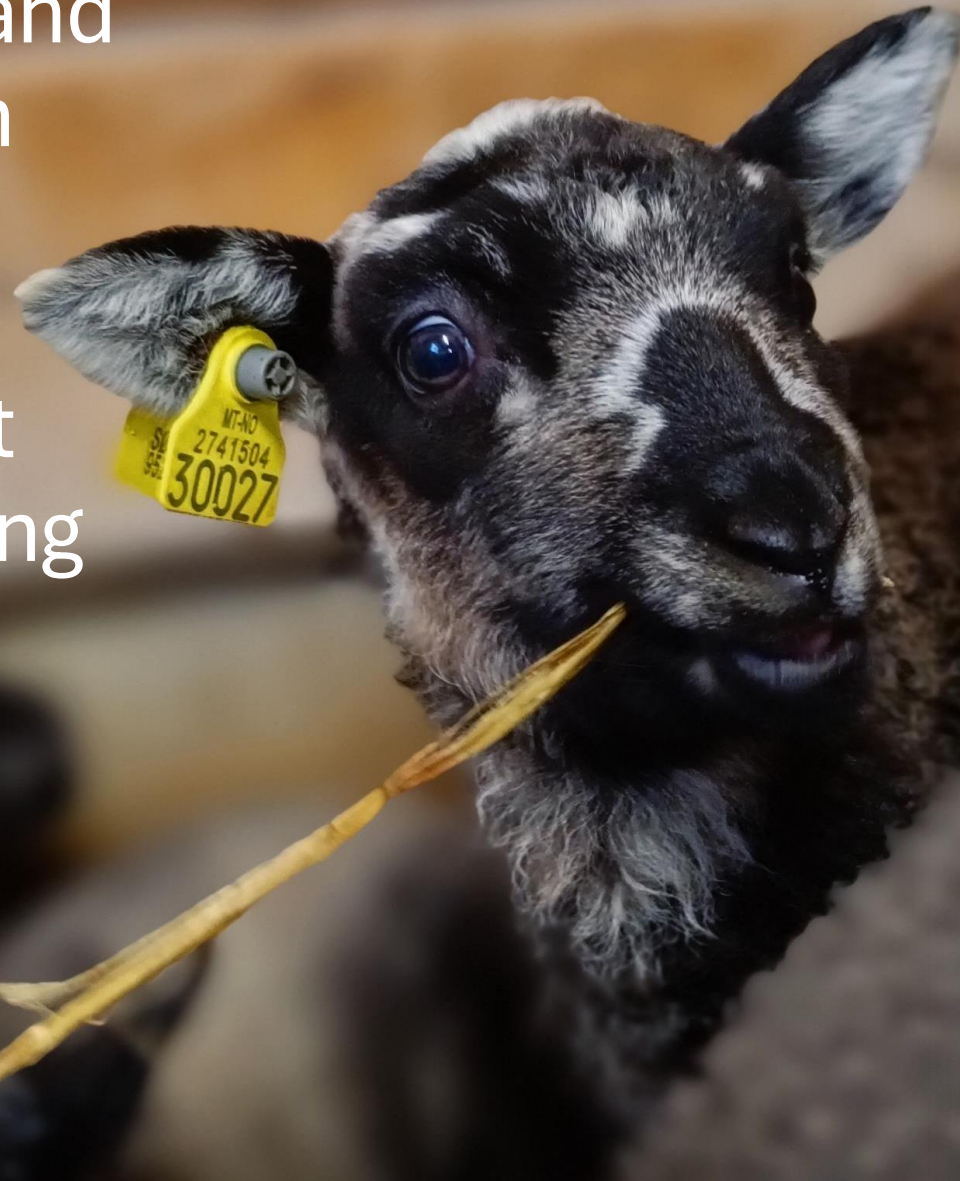


The mother-young bond and the process of weaning in farm animals

- Consequences for behavioural development and welfare of the offspring

Trial lecture
Juni Rosann E. Johanssen
09.02.24, NMBU

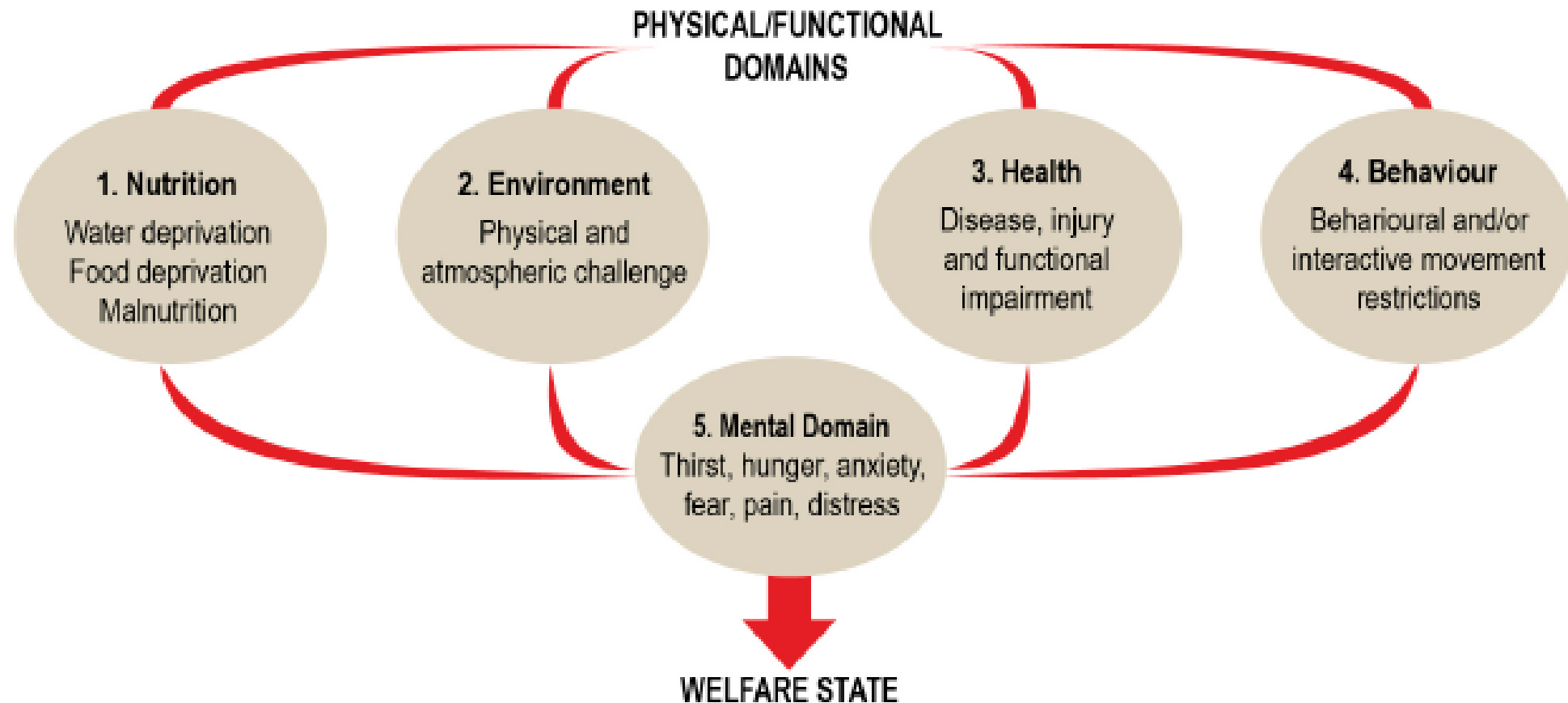


Agenda

- Animal welfare
- Definitions
- Focus cattle, sheep, pigs
- Bonding
- Hider or follower
- Natural suckling and weaning
- Weaning practice
- Separation and weaning challenges and actions
- Offspring behavior and welfare
- Human-animal interactions
- Finals thoughts and considerations



Animal welfare – Five domains



Definitions

- Mammal: Warm-blooded, fur/hair, milk¹
- Ungulate: One, two or three toes²
- Articial: Born less developed²
- Precocial: Born more developed²
- Bonding: Establishment of relationship
- Weaning: Accustom to solid feed



Cattle, sheep and pigs

Gestation – Number of offsprings – Number of teats

- Cattle: 9 months, 1 calf, 4 teats
- Sheep: 5 months, 2 lambs, 2 teats
- Pigs: 3.7 months – 16 piglets, 14-16 teats

– Det var helt vanvittig å se på, det tok jo aldri slutt

Søya fra Snertingdal stoppet ikke før hun hadde født hele åtte lam. Ekspertene har aldri hørt på maken.



Stein S Eide
Journalist

Publisert 4. mai 2015 kl.
18:07
Oppdatert 5. mai 2015 kl.
11:27

Artikkelen er flere år gammel.

SVÆRT SJELDEN: Den seks år gamle søya fra Snertingdal fikk hele åtte lam på en gang.
FOTO: PRIVAT

Fyttigrisen for en fødsel

HAMAR (NRK): Det er stappfullt i bingen til purka Gode Gloria. Tirsdag fødte hun hele 26 unger, nesten dobbelt så mange som et gjennomsnittlig grisekull.



Line Fosser Vogt
Journalist

Hans Solbakken
Journalist

Publisert 9. mai 2019 kl. 14:03
Oppdatert 9. mai 2019 kl. 15:53

Artikkelen er flere år gammel.

GRISEFLAKS: Gode Gloria slapper av i bingen etter å ha født 26 grisunger. Purka har vært heldig som fikk så mange unger, forteller ekspertene.

Bonding





Mother-young bonding

- Significant for offspring survival ¹
- Suitable birth place ²
- Signals and stimuli for bonding:
 - Smell, vocalizations, tactile ^{3 4}
- Meet the offspring's needs (e.g. nourishment and protection) ⁵
- Bonding characteristics (e.g. allogrooming, proximity) ⁵
- Recognition learning ⁶, behavioral and social learning ⁷
- Variety in maternal behavior (e.g. stress ⁸, genes⁹, feed access ¹⁰)

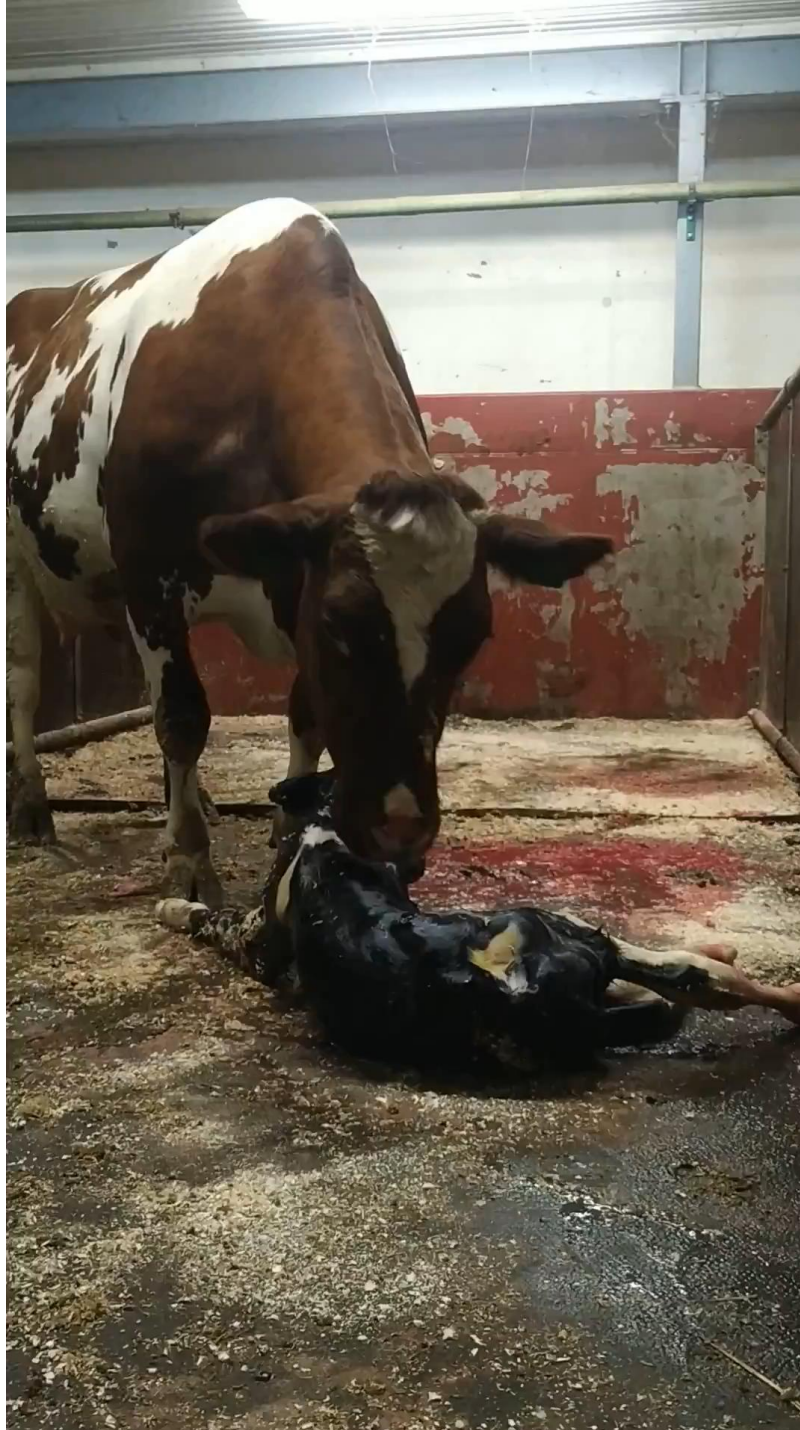
Ref: Nowak et al. 2000¹, Rørvang et al. 2018², Fleming et al. 1999³, Okabe et al. 2012⁴, Newberry & Swanson 2008⁵, Bienboire-Frosini et al. 2023⁶, Orihuela & Galina 2021⁷, Dwyer 2013⁸, Nevard et al. 2022⁹, Berger 1979¹⁰

Cow-calf bonding

- Leave herd before calving:
 - Affected by genes and environment ¹
- Licking of calf – Most during first hour ^{2 3}
- Calf try standing after 10 min, standing after 46 min, suckling after 97 min ³
- Variety in maternal behavior
 - One breed more licking and longer suckling than another breed ⁴
 - Primiparous cows – more abnormal maternal behavior ⁵



Cow-calf bonding



Ewe-lamb bonding

- Leave herd before lambing ¹:
 - Affected by genes, environment ², domestication ³
- Licking of lamb ⁴
- Standing within short time, down to a few minutes ⁵
- Suckling within first hour ⁶
- Bond through odour ⁷, visual and acoustic signals ⁸
- Accept own lamb, reject other lambs ⁸
- Variety in maternal behavior:
 - Sheep adapted a tougher environment – more intense maternal behavior, more protective ^{8,9}



Sow-piglets bonding

- Can walk 5-10 km to find nest-place¹
- 10 h on building nest¹
- No licking of piglets¹
- Vocalisations and nose-to-nose-contact²
- More communication while active – Less mortality³
- Protective mothers – Less crushing⁴



Hider or follower?

- Hider – Offspring hides the first days¹
- Follower – Offspring follow the mother from first day¹
- May vary within species²
- Cattle – Hiders^{1,3}, but some variation depending on environment⁴
- Sheep – Followers¹, but muflon lambs observed to hide for 3 days⁵
- Pigs – Hiders, in nest for 1-2 weeks⁶, more outside the nest the last days⁷, may change nest within the 1-2 weeks⁸
- Followers suckling – More frequent and short bouts¹
- Hiders suckling – Less frequent and longer bouts¹



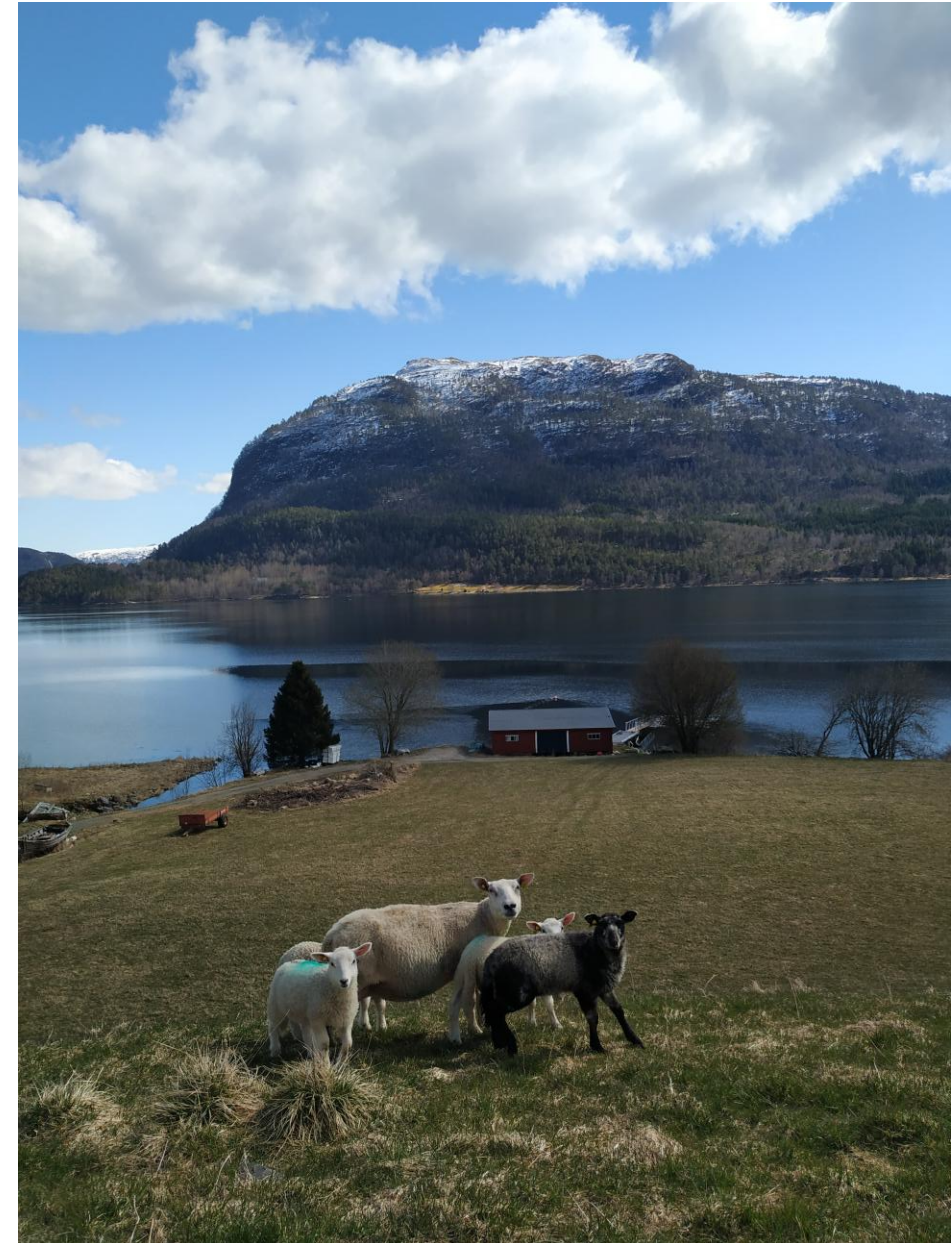
A close-up photograph of a brown and white cow's udder on the left. A brown calf is suckling from the teat. The calf's head is in profile, facing left, with its mouth on the teat. The calf has a bright green collar around its neck with a yellow identification tag that reads "MT NO 2503008-0 3717". A black rectangular device is attached to the bottom of the collar by a chain. The background is green grass.

Suckling and
weaning in cattle,
sheep and pigs

Natural behavior vs livestock practice

The natural weaning process

- Parental investment theory - Parent-offspring conflict¹
- Long process → Weaned offspring²
- Gradual decrease of maternal care and suckling
- Mother initiates fewer sucklings and ends more
- Offspring increase solid feed intake
- Social independence³
- Variations in weaning age⁴
- Social bonds can be lasting



Cow-calf natural suckling and weaning

- 4-10 sucklings/day¹:
 - Decrease with age²
- 7-10 min/suckling¹:
 - Varies with appetite, etc.³
- Weaning at 7-14 months⁴

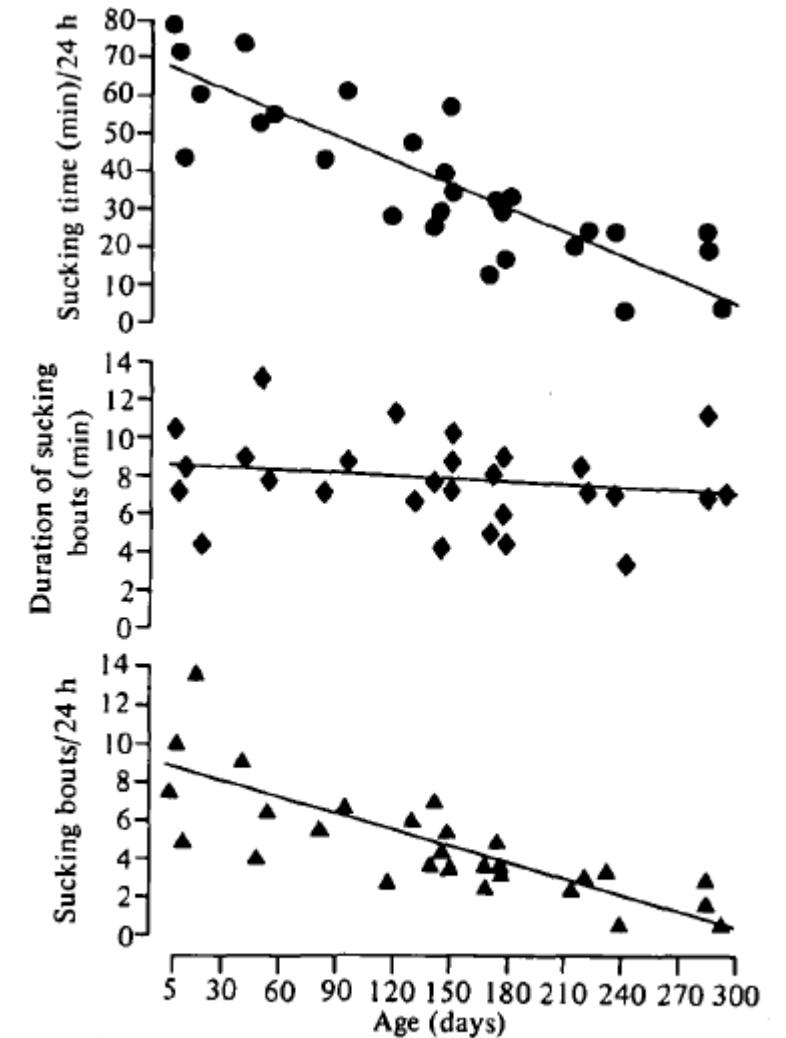
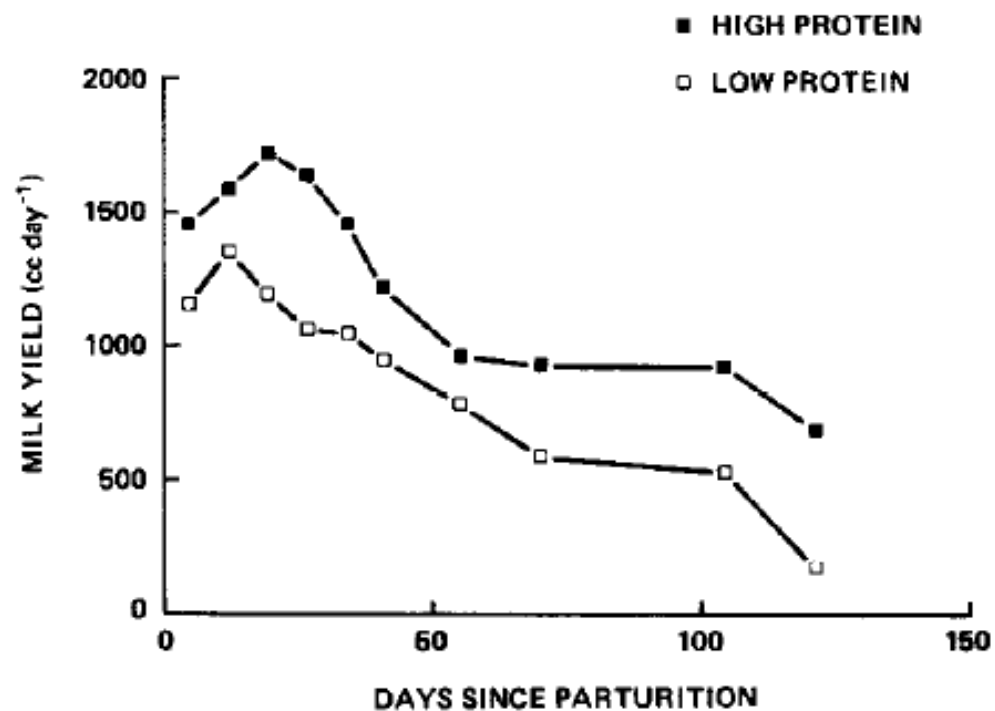
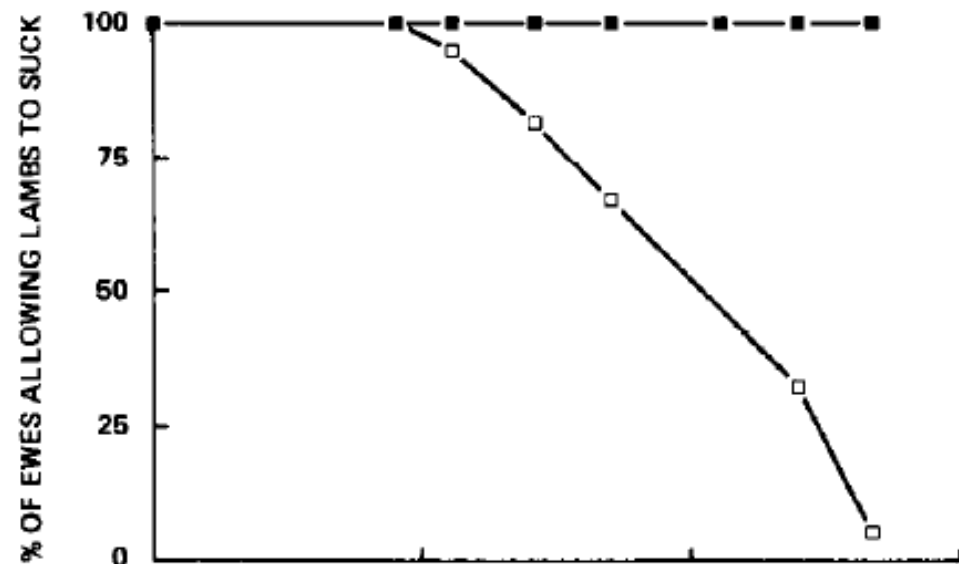


Fig. 2. Relationship between sucking performance and age in zebu calves; combined data of two 24-h observations.

Ewe-lamb natural suckling and weaning

- Suckling bouts: 1/hour¹
- Time/bout: 10-30 sec
- Bouts and time/bout decrease with age^{2,3}
- Weaning 4-6 months^{4,5,6,7,8,9,10}, up to 12 months¹¹
- E.g. variation according to feed access⁴



Sow-piglets natural suckling and weaning

- Udder massage and grunts¹
- Fixed teat order
- 5-8 min/suckling²
- Older studies:
 - Weaning 8-22 weeks^{3,4,5,6}
- New study:
 - 1,5 suckling/hour week 1⁷
 - No weaning week 11, still 0,5 suckling/hour

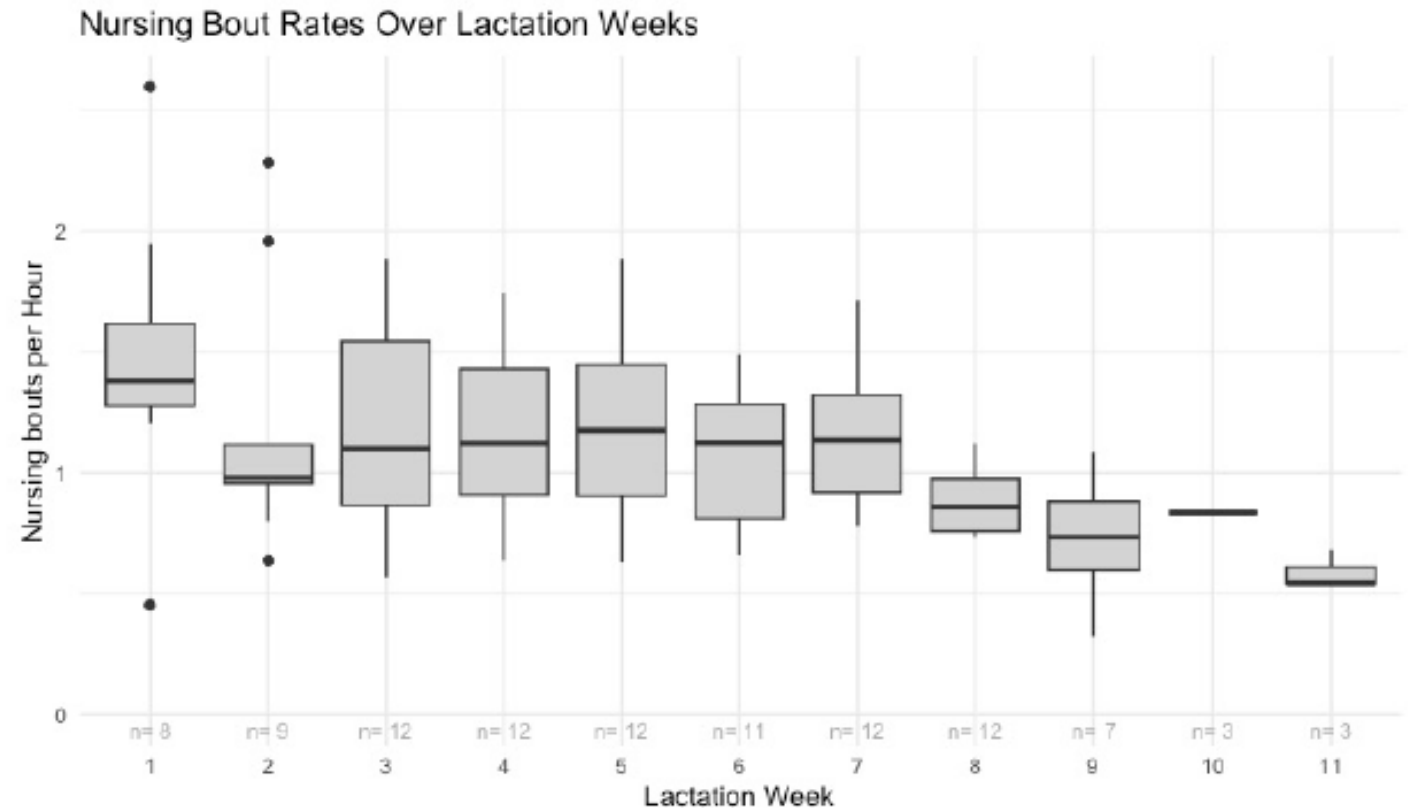


Figure 2. Boxplots of daily averaged nursing bout rates per sow within each lactation week.

The number of sows (n) is represented within each lactation week.

Livestock management – Weaning practices



Cattle farming – Weaning practice

- **Dairy cow-calf:**
 - Early separation - Deliver milk¹, decrease stress response^{1,2}
 - Norwegian survey: 3% practiced CCC and 15% wished or planned for CCC³
 - Weaning after 2-3 months⁴
- **Beef cow-calf**
 - Weaning and separation after 5-8 months⁵



Sheep farming

– Weaning practice

- Meat production
- Ewes and lambs on pasture
- Weaning 4-7 months¹
- 9% bottle-fed lambs at the farm
 - Weaned from 1 month²



Alder, dager	Antall slakt	Tilvekst fødsel-slakt, g/dag	Slaktevekt, kg	Klasse	Fettgruppe	Slakteverdi, kr
< 101	4 633	210	16,5	8,7 (R+)	6,3 (2+)	920
101-120	19 910	156	20,2	8,7 (R+)	5,8 (2+)	1152
121-130	39 381	144	20,7	8,6 (R+)	5,8 (2+)	1152
131-140	70 724	134	20,6	8,5 (R+)	5,8 (2+)	1125
141-150	83 837	123	20,3	8,4 (R)	5,9 (2+)	1086
151-160	76 896	111	19,6	8,2 (R)	5,9 (2+)	1024
161-170	65 793	100	18,8	8,1 (R)	5,8 (2+)	967
171-250	139 649	83	17,8	7,9 (R)	5,9 (2+)	900
> 250	1 487	64	18,8	7,8 (R)	6,1 (2+)	578
Gj.snitt	502 310	109	19,3	8,2 (R)	5,9 (2+)	1019

Pig farming

– Weaning practice



- Conventional: Weaning from 28 days²
- Organic: Weaning from 40 days³
- Average weaning age: 33.2 days¹
- Large litters – Some are separated earlier
– Fed milk replacement²

Landsresultater					
	2018	2019	2020	2021	2022
Antall besetninger	340	332	324	312	299
Antall årspurker per besetning	117	115	115	117	116
Antall kull per besetning	252	250	251	257	254
Beregna avvente per årspurke	27,1	27,9	28,4	28,9	29,5
Kull per årspurke	2,19	2,20	2,21	2,22	2,23
Levendefødt per kull	14,1	14,5	14,6	14,8	14,9
Dødfødt per kull	1,1	1,1	1,1	1,1	1,1
Totalfødt per kull	15,2	15,7	15,7	15,9	16,0
Avvent per kull	12,3	12,7	12,8	13,0	13,1
Dødfødte av totalfødte, %	7,0	7,1	7,0	7,1	6,9
Døde til avvenning, %	12,5	12,7	12,2	12,2	12,0
Totaldødelighet, %	18,6	18,9	18,3	18,4	18,0
Diegivingstid	33,3	33,5	33,4	33,2	33,2
Prosent 1. kull	37,8	36,1	36,9	36,6	35,8
Dager fra avvenning til bedekning	6,0	6,1	5,9	5,9	5,8

Livestock management practice

- Often abrupt and permanent separation, earlier than natural¹
- Ensure reproductive performance
- **Consequences:**
 - Stress^{2,3}
 - Abnormal behavior^{2,3}
 - Solid feed intake⁴
 - Reduced learning transfer related to survival⁵ (e.g. learning about grazing, predators, social learning⁶)





some pigs persistently show this 'belly nosing' behaviour

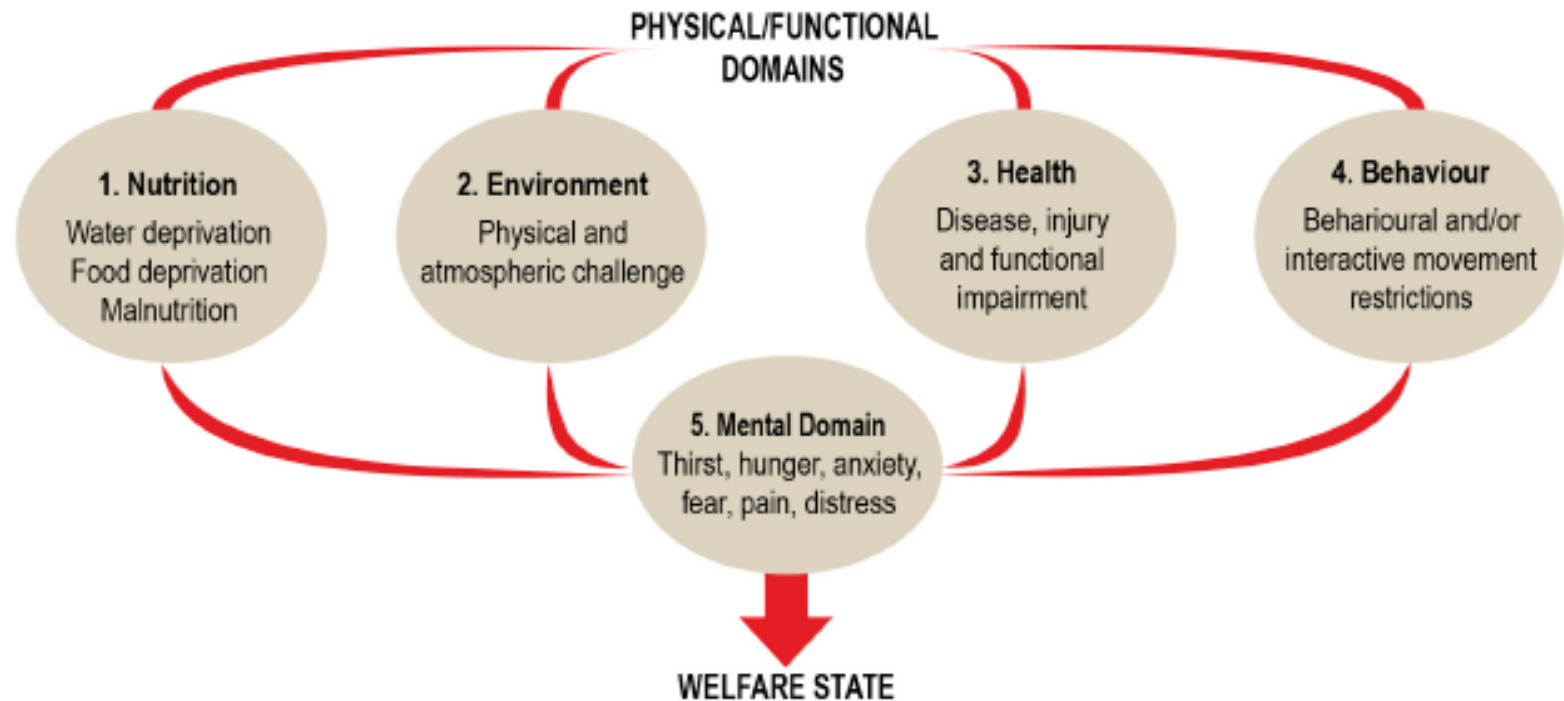
Weaning practice:

- Effects on offspring's behavior and welfare
- How to improve their welfare?



Stress around weaning and separation

- Mother-offspring interactions
→ Improve welfare¹
- Mother-offspring separation
→ Stress, decrease welfare²
- More changes for offspring (e.g. other feed, environment, social conditions^{3,4})
→ Increase stress



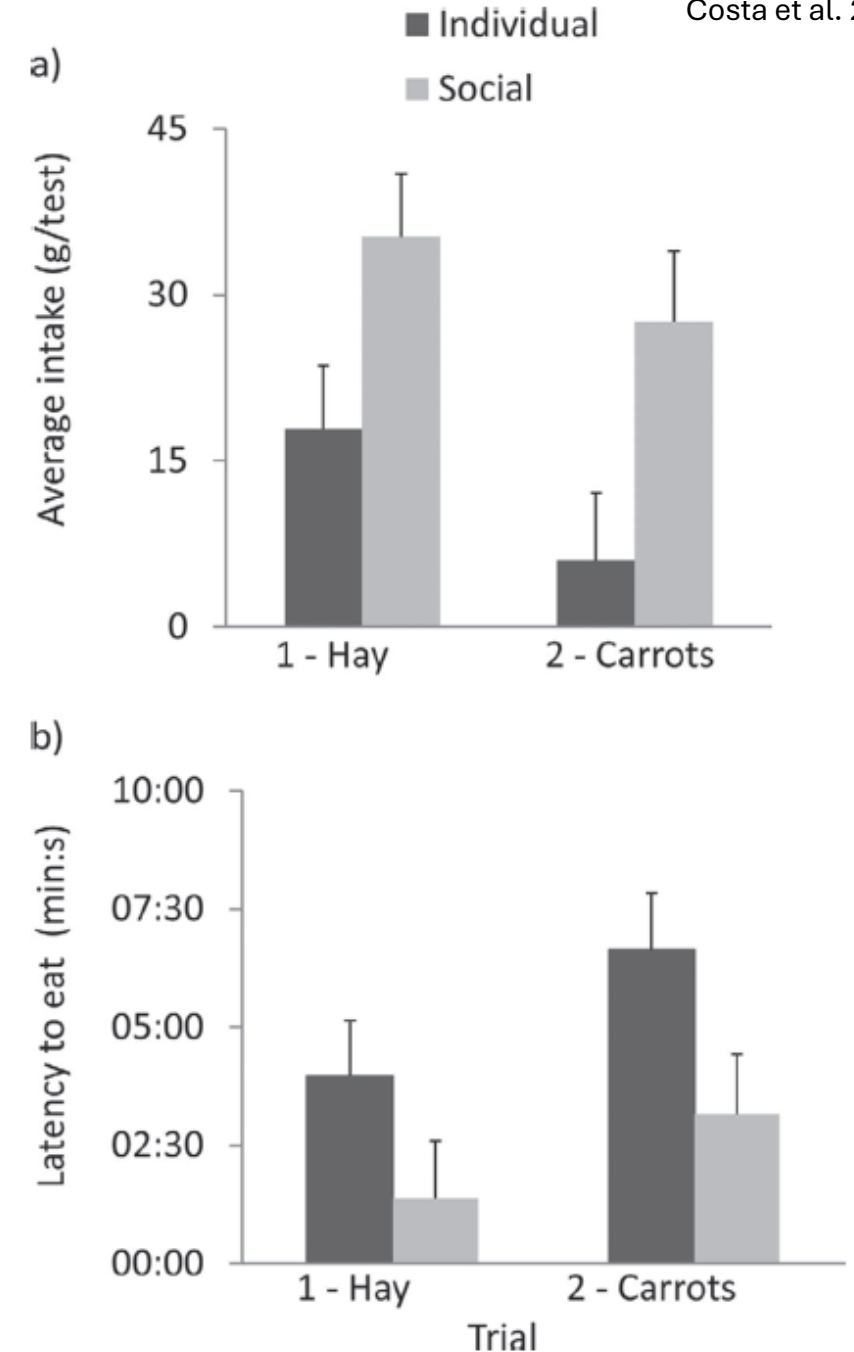
How to reduce stress around separation and weaning?

- Ensure maternal care¹ → Learning²
- Suitable environment³
- Postponement of separation¹
- Separation and weaning at different times
- Gradual separation and weaning
 - Varying results on stress⁴
- Stimuli substitutes¹
- Gradual intro to something new
 - (e.g. feed, other animals⁵)



Calf behavior and welfare

- **CCC dairy calves:**
 - Safety, reduced fearfulness¹
 - Improved social behavior²
 - Reduced abnormal behavior
 - Reduced stress responses
- **Less fearful and better coping skills:**
 - Novel situations³
 - Unfamiliar calves^{4,5,6}
 - Novel feed⁷
- **Other factors also affect calf learning:**
 - Genes⁸, individual variations^{9,10}, feed¹¹, isolation^{12,13}
- Calf-calf learning also important^{14,15}



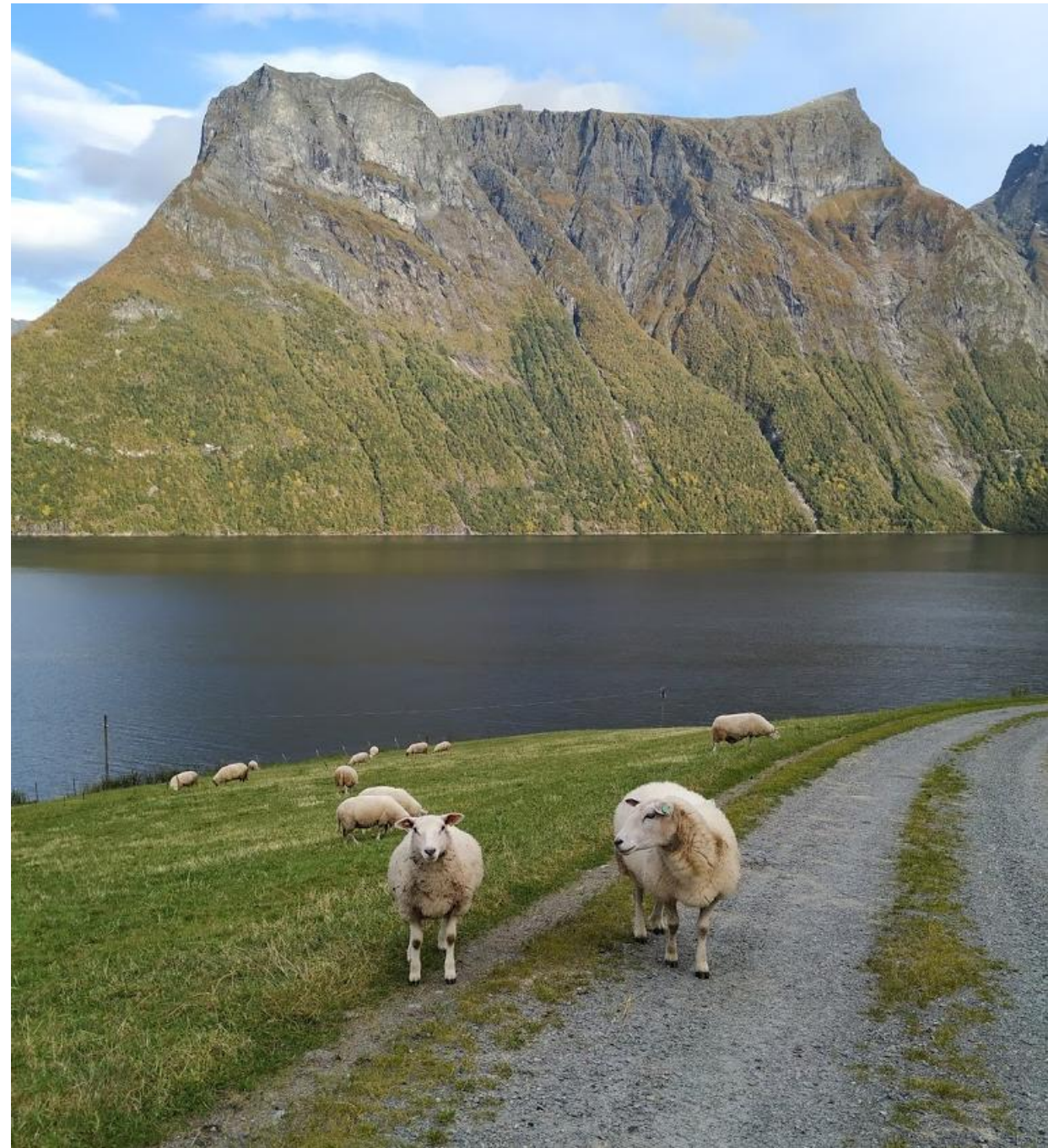
Calf behavior and welfare

- **Factors affects calf behavior:**
 - E.g. nutrition, housing system¹
- **Common practice:**
 - Individual calf rearing^{1,2}
 - Restricted milk allowance
- **Natural behavior increased by:**
 - Ad libitum milk feeding
 - Social calf rearing (e.g. more play)³
 - Early access to roughage²



Lamb behavior and welfare

- **Ewe-lamb contact:**
 - Several months, natural behavior
- **Weaning and separation:**
 - Before natural weaning
 - Stress response
- **Outfield pasture (utmark):**
 - Challenge with lamb mortality¹
 - Importance of ewe and lamb being together²
- **Bottle-fed lambs on farm:**
 - Taken care of by farmer
 - Outfield pasture later – May be problematic^{3,4}



Piglet behavior and welfare

- **Nest building is important:**
 - Provide straw and free movements¹
- **Farrowing crate:**
 - Decrease sow crushing piglets²
 - Prevents maternal behavior and thus increase mortality by other factors
- **Farrowing pen:**
 - Increase maternal behavior^{3,4}



Piglet behavior and welfare

- **Pen or group system:**
 - Increase natural behavior (e.g. play, feeding behavior, social skills)^{2,3,4,5}
 - Increase feed intake^{2,5}
 - Decrease abnormal behavior^{2,5}
 - Decrease injuries^{2,3}
- Being with others before weaning^{1,4,7,8,4,9}
- Enrichments – Positive effects¹⁰
 - Before and after weaning^{4,5}



Human-animal interactions

- **Animal welfare – Behavioral interactions:**
 - Importance of human-animal interactions^{1,2,3}
- **Companionship, safety:**
 - Rewarding, calming effect⁴
 - Positive for offspring separated from their mothers^{6,7}
- **Lambs separated from mother:**
 - Formed strong attachment to humans⁵,
- **Positive human-pig interactions:**
 - Reduced fear⁸ and stress⁹
- **Importance of farmers wellbeing and attitudes^{10,12}:**
 - Pig farmers expressed joy working – Confident pigs¹¹
 - Negative attitudes – Negative moods in calves³



Final thoughts and considerations

- Welfare by mother-offspring interactions
- Welfare by other factors
- Positive interactions with others
- **More research?**
 - Increase welfare around weaning and separation
 - Being with mother vs being with others and having a satisfying environment and feeding
 - What does the difference mean for the offspring's welfare?



Thank you for listening 😊

