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PhD – Final seminar

Cow-calf contact (CCC) in Norwegian dairy farming

Interviews with CCC farmers and an experiment with CCC on pasture

Juni Rosann E. Johanssen 21.06.2023

Supervisors

Main supervisor:

- Knut Egil Bøe, Norwegian University of Life Sciences (NMBU)

Co-supervisor:

- Julie Føske Johnsen, Norwegian Veterinary Institute

«Extra» supervisors:

- Kristin M. Sørheim, Norwegian Centre for Organic Agriculture (NORSØK)
- Steffen Adler, Norwegian Institute of Bioeconomy Research (NIBIO)
- Mette Vaarst, Aarhus University

Projects and financing

SUCCEED (2020-2023) "*Establish science based and practically feasible methods to allow increased contact between cow and calf in dairy production*":

- The Norwegian Research Council, Research funding for the agriculture- and food industry (FFS-JA)

Kalvelykke (Calf Happiness) (2019-2022):

- Regional Research fund Mid-Norway

Dairy cow and calf together on pasture (2020-2021):

- The Norwegian Animal Protection Alliance's Research Fund

Forskningsrådet

REGIONALE FORSKNINGSFOND MIDT-NORGE

Dyrevernalliansen

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My PhD (aug. 2020 - aug. 2023)

- Researcher NORSØK, Tingvoll (2017-)
- PhD-candidate NMBU, Ås (2020-)

Aim:

- *Acquire new knowledge about Norwegian dairy farming systems with cow-calf contact (CCC), through interviews with CCC farmers and an experiment with CCC on pasture.*

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Course code	Course name	Place	Level	Exam	ECTS	
	1. Qualitative interview methologies in agricultural and veterinary research	Aarhus universitet	Ph.d. ☒ Master ☐	V ☒ H ☐ 2019	5	✓
PHI401	2. Research Ethics and Philosophy of Science	NMBU	Ph.d. ☒ Master ☐	V ☐ H ☒ 2020	5	✓
	3. Scientific analysis of transition and change processes related to animal agriculture	Aarhus universitet	Ph.d. ☒ Master ☐	V ☒ H ☐ 2021	5	✓
HET401	4. Individual PhD Course in Ethology	NMBU	Ph.d. ☒ Master ☐	V ☒ H ☐ 2022	10	✓
PVS0170	5. Biology of lactation in dairy systems with cow and calf contact	SLU	Ph.d. ☒ Master ☐	V ☒ H ☐ 2022	5	✓
VET414	6. Applied statistics for experimental and laboratory oriented studies in veterinary science	NMBU	Ph.d. ☒ Master ☐	V ☐ H ☒ 2022	5	✓
Total number of ECTS in course plan					35	

+ VET420 Writing the PhD thesis, NMBU, spring week 11 2023, 0 ECTS

Articles in my thesis

- **Juni Rosann Engelien Johanssen,** Gunn-Turid Kvam, Brit Logstein & Mette Vaarst, 2023. **Interrelationships between cow, calf, and human in cow-calf contact systems – an interview study among Norwegian dairy farmers**. *Journal of Dairy Science,* (Accepted in February)

- **Juni Rosann Engelien Johanssen,** Julie Føske Johnsen, Kristin Marie Sørheim, Knut Egil Bøe. **Behaviour in dairy calves with or without their dams on pasture.** *Applied animal behaviour science* (First review in June)

- **Juni Rosann Engelien Johanssen,** Steffen Adler, Julie Føske Johnsen, Kristin Marie Sørheim & Knut Egil Bøe. **Performance in dairy cows and calves with or without cow-calf contact on pasture**.
  Journal of dairy science, (Submit in July)

A) Activities/Milestones	Gjennomføres
Planning of PhD, interviews with farmers having CCC and experiment with cow and calf on pasture	Vår ☐ Høst ☒ År 2020
Farm visits, interviews and transcription	Vår ☐ Høst ☒ År 2020
Start seminar (February)	Vår ☒ Høst ☐ År 2021
More interviews, transcription, analysis of interviews	Vår ☒ Høst ☐ År 2021
Planning of experiment with cow and calf on pasture	Vår ☒ Høst ☐ År 2021
Conducting experiment with cow and calf on pasture (May-August)	Vår ☒ Høst ☒ År 2021
Process and analyse results from experiment	Vår ☐ Høst ☒ År 2021
Publish Norsøk-report and article in Buskap from the interviews	Vår ☐ Høst ☒ År 2021
Mid way seminar / evaluation (May)	Vår ☒ Høst ☐ År 2022
Write scientific article 1 interviews	Vår ☒ Høst ☒ År 2022
Article 1 interviews accepted by JDS (February)	Vår ☒ Høst ☐ År 2023
Be finished analysing results from experiment	Vår ☐ Høst ☒ År 2022 Vår ☒ Høst ☐ År 2023
Write scientific articles 2 and 3, from experiment	Vår ☐ Høst ☒ År 2022 Vår ☒ Høst ☐ År 2023
Article 2 submitted (May), major revision (June-July)	Vår ☒ Høst ☐ År 2023
End seminar (June)	Vår ☒ Høst ☐ År 2023
Submit article 3 (July)	Vår ☒ Høst ☐ År 2023
Write and finish thesis (June-August)	Vår ☒ Høst ☒ År 2023
PhD defense (December)	Vår ☐ Høst ☒ År 2023

Introduction of the thesis – Something like this?

Introduction

- Norwegian context
- Increased interest in dairy CCC systems
- Farmers about CCC
- Calf behaviour in CCC systems
- Cow performance in CCC systems
- Calf performance in CCC systems
- Knowledge gaps (farmers practicing CCC, and CCC on pasture)
- Aims of the thesis

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Interviews and experiment

Interviews winter 2020-2021:

- Aim article 1:

  Explore how Norwegian dairy farmers with CCC systems practice these systems and how they experience and perceive the interrelationships between the cows and calves and the humans within these systems

Experiment summer 2021:

- Aim article 2:

  Investigate the activity, feeding and social behaviour of pastured dairy calves with or without their dams, as well as the calves' behaviour in a food neophobia test

- Aim article 3:

  Compare performance in cows and calves with or without CCC on pasture through machine milk yield and composition and calf weight gain. We also aimed to describe cow body weight and condition, calf intake of concentrates, the artificial milk fed calves' milk intake, and health of both the cows and the calves.

Article 1

- Submitted Nov 2022
- Major revision Dec 2022
- Minor revision Feb 2023
- Accepted Feb 2023
- Proof June 2023

J. Dairy Sci. TBC:1–17 JDS22999
https://doi.org/10.3168/jds.2022-22999

Interrelationships between cows, calves, and humans in cow-calf contact systems—An interview study among Norwegian dairy farmers

Juni Rosann E. Johanssen,[1*] Gunn-Turid Kvam,[2] Brit Logstein,[2] and Mette Vaarst[3]
[1]Norwegian Centre for Organic Agriculture (NORSØK), 6630 Tingvoll, Norway
[2]Institute for Rural and Regional Research (Ruralis), 7049 Trondheim, Norway
[3]Department of Animal and Veterinary Sciences, Aarhus University, 8830 Tjele, Denmark

ABSTRACT

In recent years, the common dairy farming practice of early separation of dam and calf has received increased attention. Our aim was to explore how Norwegian dairy farmers with cow-calf contact (CCC) systems apply these systems in practice, and how they experience and perceive the interrelationships between cows and calves and humans within these systems. We conducted in-depth interviews with 17 farmers from 12 dairy farms and analyzed responses inductively, inspired by the grounded theory approach. The farmers in our study practiced their CCC systems differently from each other and had varying as well as common perceptions about these systems. Calves' intake of colostrum was not seen as a challenge, regardless of practice. The farmers generally perceived that any aggression shown by cows toward humans was merely an exhibition of cows' natural protective instinct. However, when the farmers had good relationships with their cows and the cows felt safe around them, the farmers could handle the calves and build good relationships with them as well. The farmers experienced the calves learning a lot from their dams. Most of the farmers' dairy housing together. Animal welfare and natural behavior were important to the farmers.
Key words: semistructured interviews, dam-rearing, farmers' perceptions

INTRODUCTION

Separating dairy cows from their calves immediately or shortly after birth is a common practice in dairy farming (Hötzel et al., 2014; Pempek et al., 2017; Abuelo et al., 2019). For many decades, most farmers have not questioned the practice. They base their arguments mostly on lower volumes of saleable milk (see review by Meagher et al., 2019), more stress around separation after more time together (Weary and Chua, 2000; Berge and Langseth, 2022), and potential risk of transmitting infection between cows and calves (see review by Beaver et al., 2019). Others have argued that calves would become "wild" when in the cow group and not fed by humans (Vaarst et al., 2020). Another concern has centered on possible aggressive behavior of mother cows as they attempt to protect their calves, thus creating a less safe working environment (Berge and Langseth, 2022; Neave et al., 2022). Last, the

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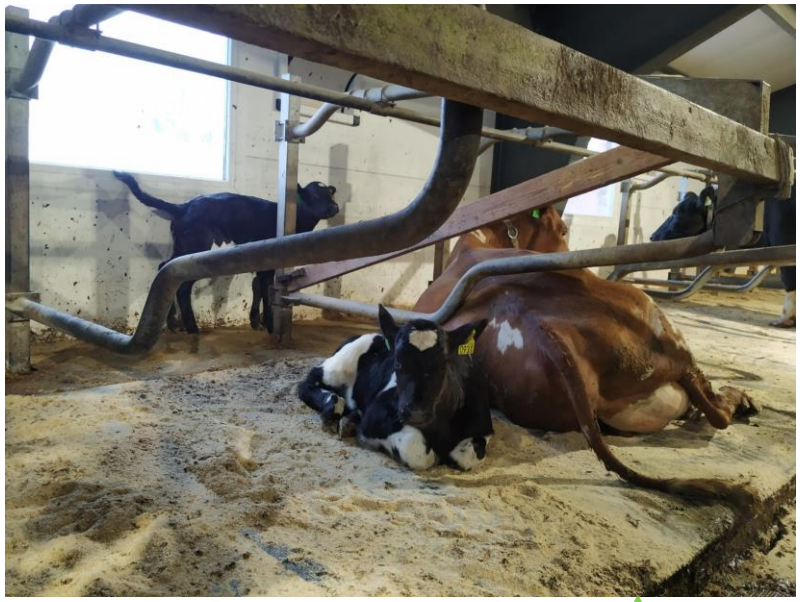
The farms

- 17 farmers from 12 farmers
- Organic: 4, Conventional: 8
- Welfare label: 2
- Freestalls and AMS: 6, Freestalls and milking parlour: 2, Tiestalls: 4
- 14-60 dairy cows: 8 fewer than average (30) and 4 more than average
- Milk quota: 75 – 420 tonnes (two with cheese prod.)
- Calving time: All year: 7, spring: 1, autumn: 2, other: 2



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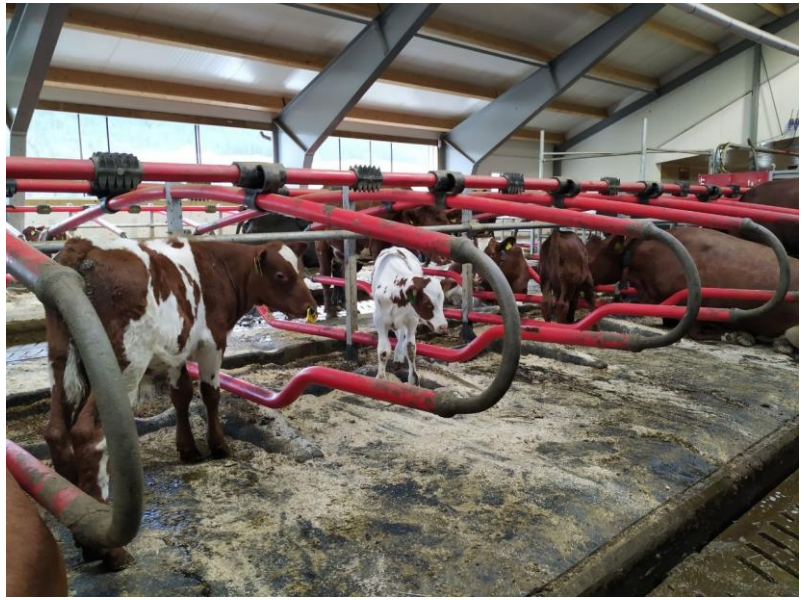
Cow-calf contact practice

- 3 farms started in the 90s and 9 farms 2015-2019
- CCC: 6 weeks-4 months
- Most had cow-calf alone in calving pen for some days after calving (bonding)
- All farms with CCC in cow area
- 7 farms with CCC on pasture
- 2 farms continued with milk feeding after full separation
- 10 farms had CCC whole milk feeding period
- Separation and weaning: Abrupt, nose flap, gradually with fenceline and/or less time together



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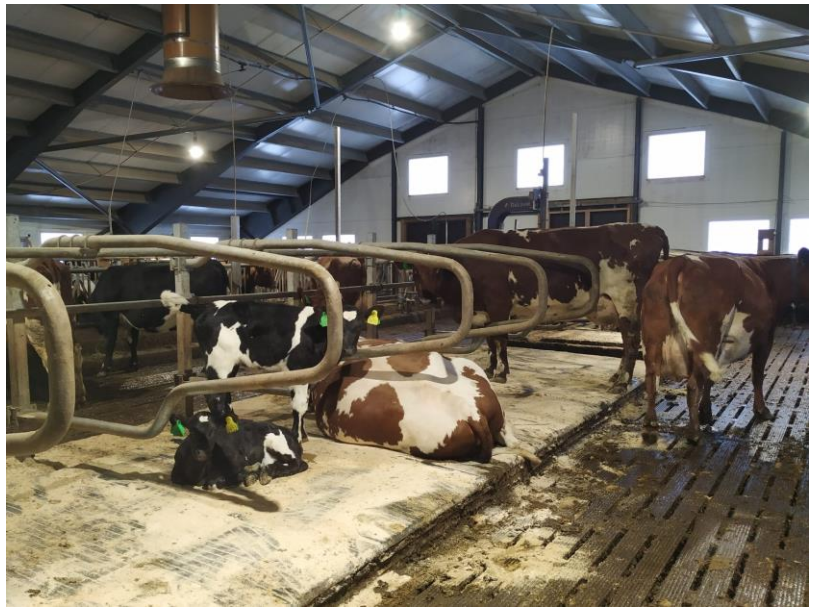
Conclusions

- Different practices
- Colostrum intake – not a challenge
- Cows protecting their calves
- Good relationships between farmer, cow and calf
- Calves learning
- Housing systems not adapted
- Different opinions about CCC on pasture
- Challenge with separation stress – but several found methods to minimize this
- Different opinions about workload – but less time on calf feeding
- The farmers are thriving with these systems
- Animal welfare and natural behaviour – important for these farmers



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Article 2

- Applied Animal Behaviour Science
- Submitted May 2023
- Major revision June-July 2023

Manuscript

Click here to view linked References

Click here to access/download;Manuscript;Johanssen et al. 2023 Behaviour of dairy calves...docx

Behaviour of dairy calves with and without their dams on pasture

Juni Rosann E. Johanssen[1*], Julie Føske Johnsen[2], Kristin Sørheim[1], Knut Egil Bøe[3]

[1]Norwegian Centre for Organic Agriculture, 6630 Tingvoll, Norway

[2]Norwegian Veterinary Institute, 1433 Ås, Norway

[3]Norwegian University of Life Sciences, 1430 Ås, Norway

*** Correspondence:**

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Abstract

Dairy calves are usually separated from their dams immediately post-partum and kept inside during the milk feeding period. Conversely - keeping them on pasture with their dams can promote natural behaviour and be more accepted by the public. Our aim was to compare the behaviour of dairy calves with and without their dams on pasture. Four groups of cow-calf pairs, 17 Norwegian red cattle (NRF) and three NRF x Holstein crossbreds, were allocated to each two treatments: cow-calf contact (CC, n=10 pairs) and early separation (ES, n=10 pairs). CC pairs were kept together on pasture for 6 weeks after calving, had part-time contact in weeks 7-8, and were separated from week 9. ES cows and calves were separated one to three hours after birth and

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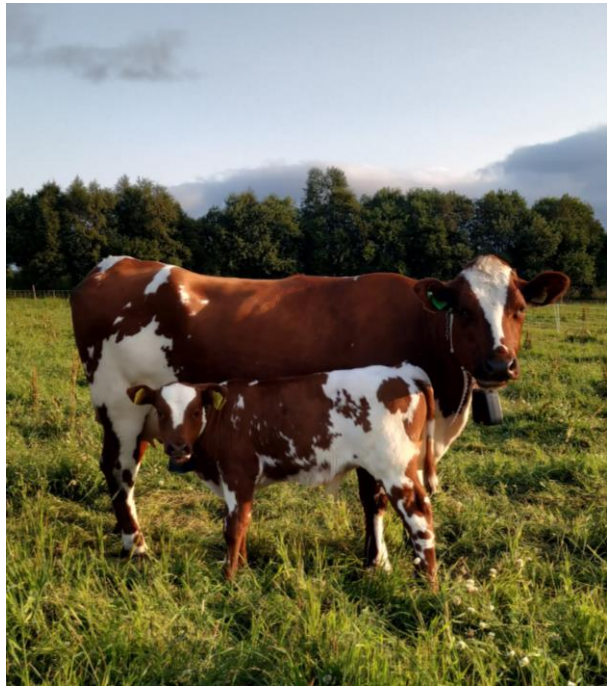
Article 3

- Submit July 2023



Performance in dairy cows and calves with or without cow-calf contact on pasture

Juni Rosann E. Johanssen[1*], Steffen Adler[2], Julie Føske Johnsen[3], Kristin Sørheim[1], Knut Egil Bøe[4]

[1]Norwegian Centre for Organic Agriculture, 6630 Tingvoll, Norway

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Interpretive Summary

Research is lacking on dairy cow-calf contact (CCC) systems on pasture. We examined the performance in pastured dairy cows and calves with and without CCC. Compared to calves fed close to ad libitum of milk from milk bars, CCC calf performance was not noticeably affected on pasture. The same was found for cow milk composition, although a lowered machine milk yield for CCC cows persisted after separation of the calves.

The experiment

- Bergtun farm with 80 cows and AMS, and their summer farm
- Calvings 7.May-14.June 2021
- 20 cow-calf pairs, four groups, two treatments
- Cow calf-contact (CC) and early separation (ES)
- Divided into groups by calving date
- Age variation for calves: 6-8 days within each group
- Norwegian red cattle, except 3 pairs with Holstein crosses in separate groups
- CC-cows: 4 primiparous- and 6 multiparous cows
- ES-cows: 1 primiparous- and 8 multiparous cows
- CC-calves: 2 bulls, 8 heifers
- ES-calves: 6 bulls, 4 heifers
- Out on pasture when youngest calf in group was 3-4 days

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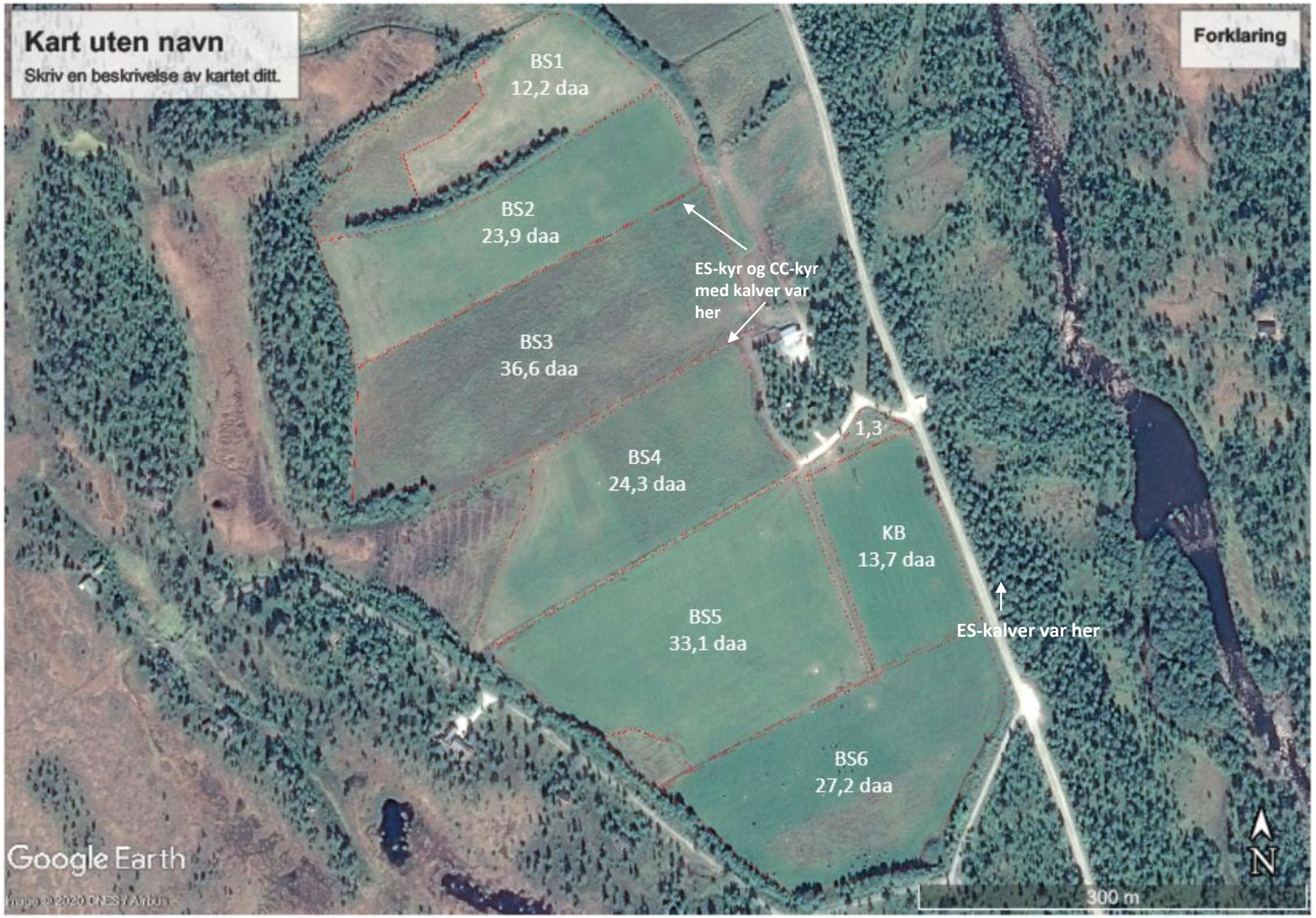
Summer farm in Nerskogen



7. May (first calf born)

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About the treatments

Treatment	CC (n=10 pairs in two groups)		ES (n=10 pairs in two groups)	
Weeks post-partum	Cow-contact	Suckling allowance	Cow-contact	Milk allowance
0-3	Whole day	Free, except during milking	1-3 hours on the calving day, then none	12 L/calf/day (four meals)
4-6	Whole day	Free, except during milking	None	14 L/calf/day (four meals)
7	Part-time	Fence-line, except after milking: 2 h morning, 2 h evening	None	8 L/calf/day (two meals)
8	Part-time	Fence-line, except after milking: 1 h morning, 1 h evening	None	4 L/calf/day (two meals)
9	Total separation (audible and visible contact)	None (cows moved 120 m away)	None	None

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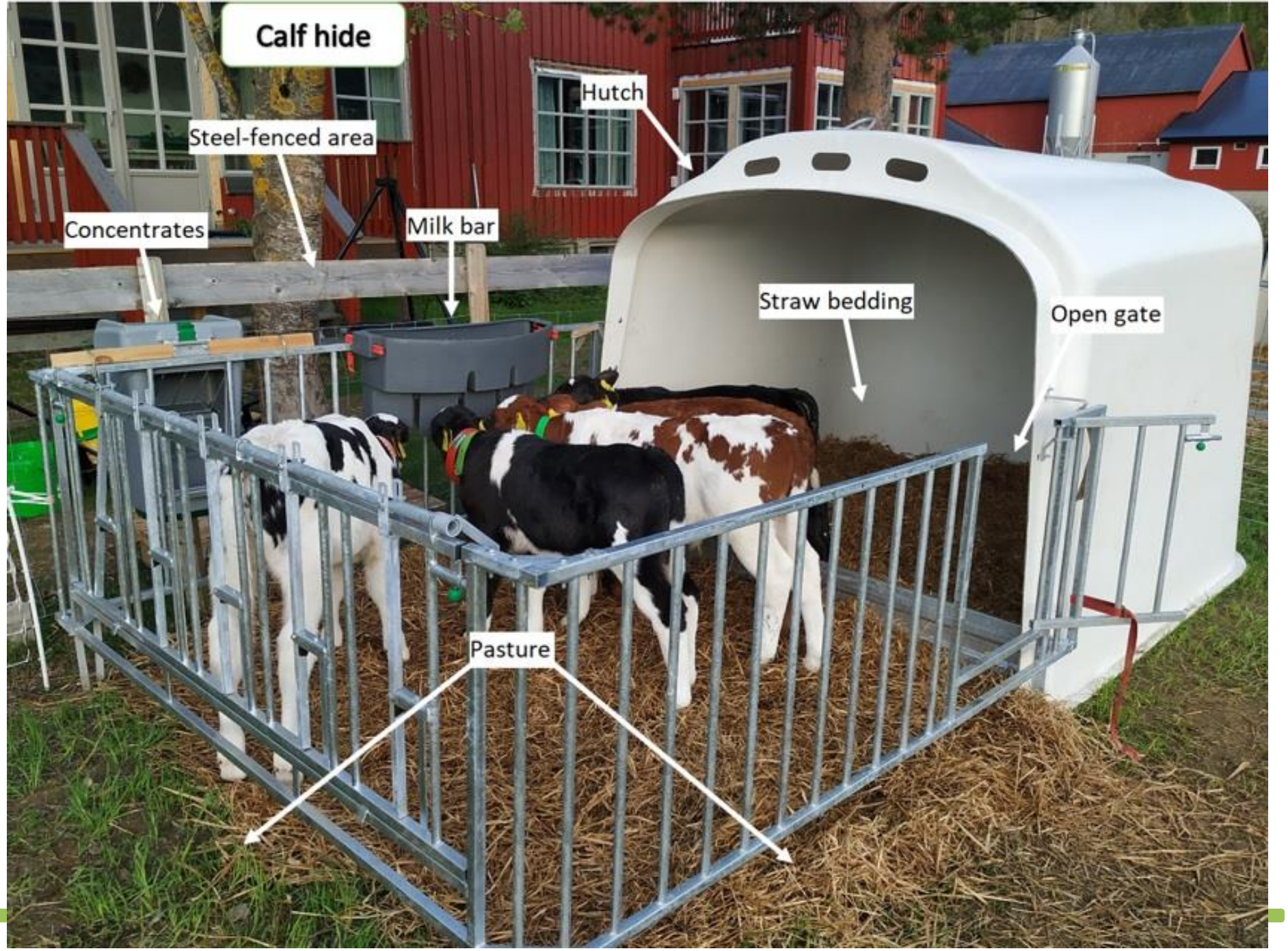

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Results calf behaviour

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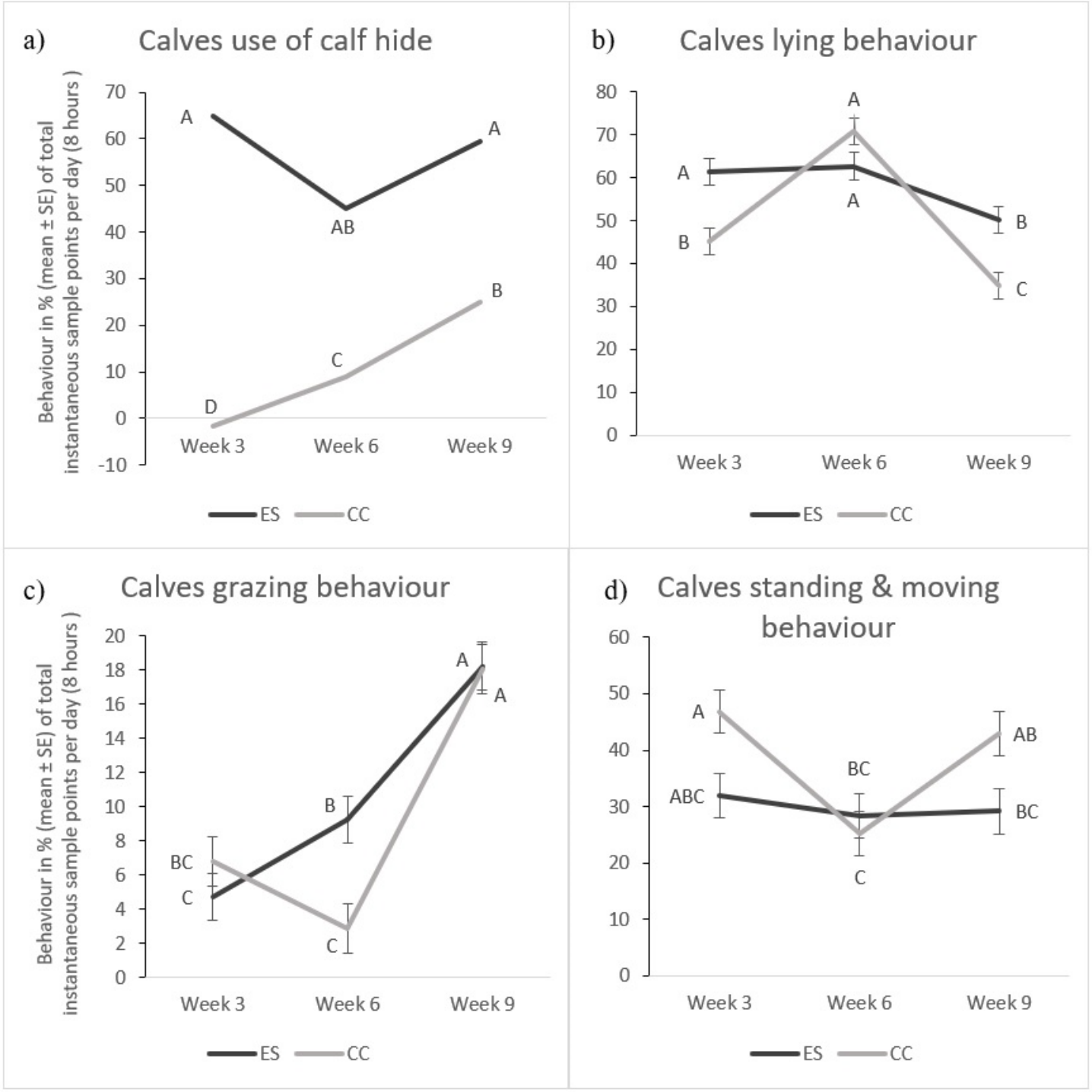
Calf behaviour

- CC used calf hide less, but more with age
- CC lying less than ES week 3 and 9
- CC and ES had similar grazing week 3 and 9
- ES grazing more than CC week 6



Standing/ moving might be excluded

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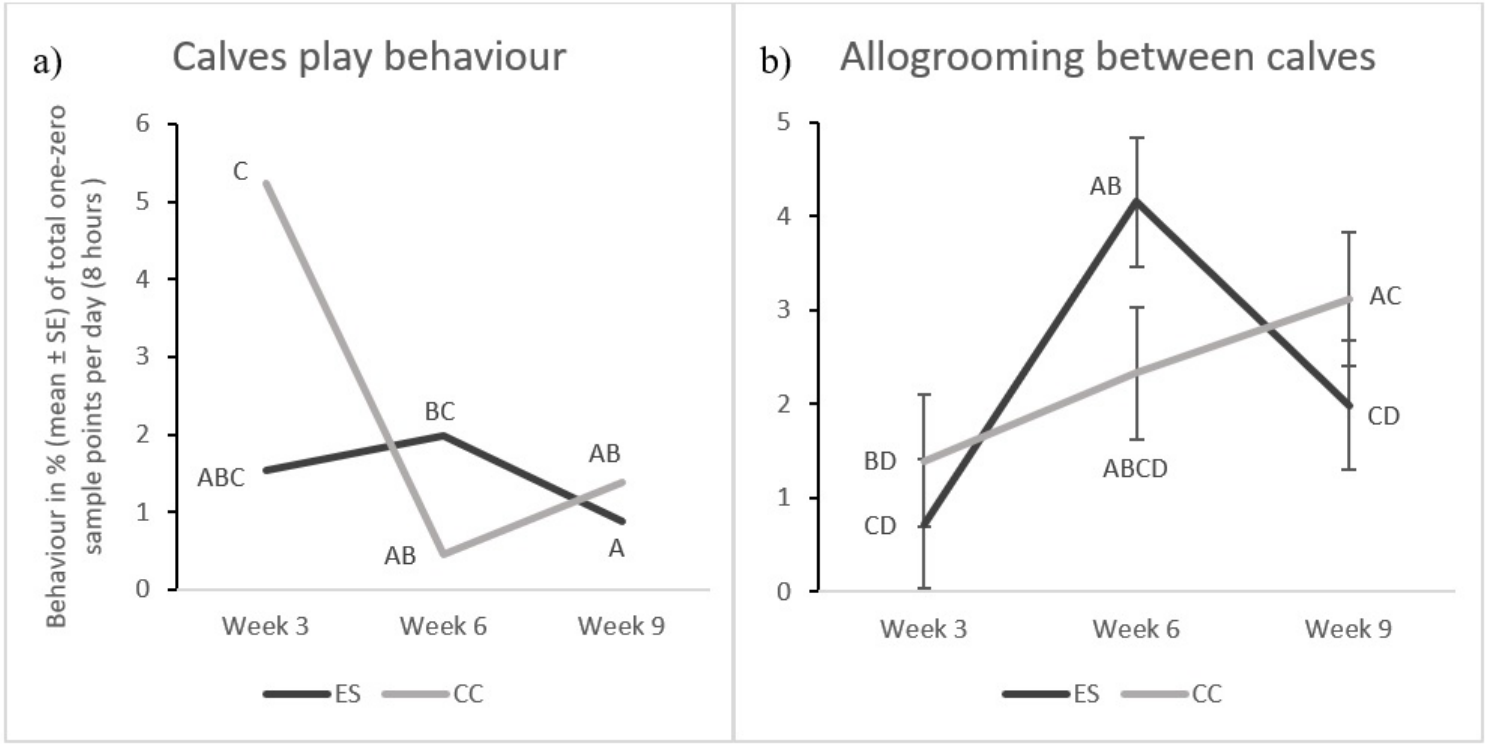
Calf behaviour

- CC more play week 3
- ES more play week 6 than 9
- CC more calf-calf allogrooming week 9 than 3
- ES more week 6 than 3 and 9
- Allogrooming cow-calf..
- Suckling and drinking milk..
- Vocalizations..



I will start work on the major revision now..

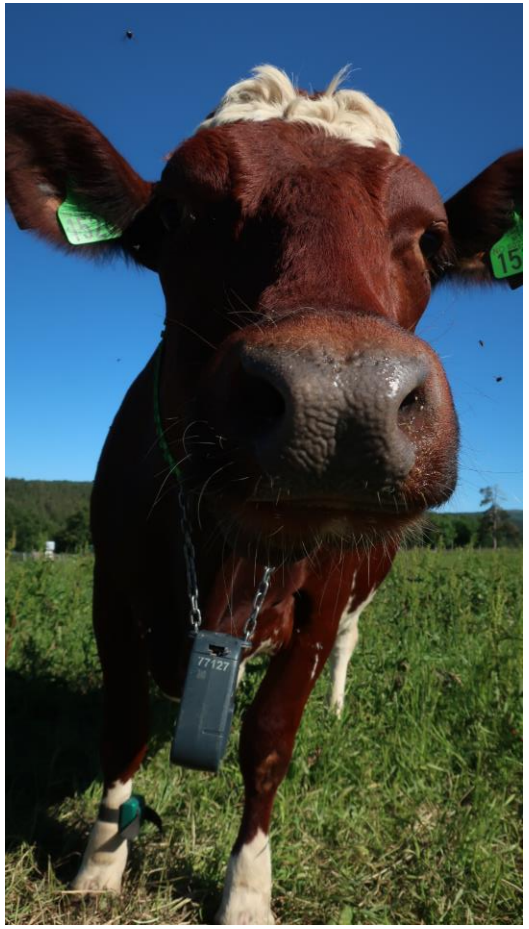
- Comments about this being a very limited study an so on..
- F.ex because of few animals
- Observations done around milking

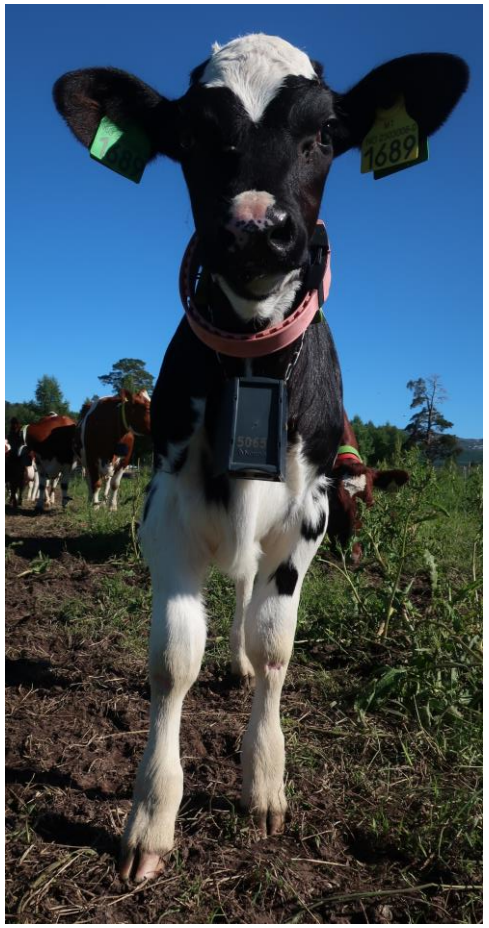
- The cows and calves also had Nofence-collars
- Was planned to also analyse data on whole day periods for:

  - Activity –cows and calves

  - Suckling in CC calves

  - GPS positions
- Unfortunately this is not analysed, and will not be a part of my PhD
- I will try to make the article better - do the best out of what we have





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Results cow performance

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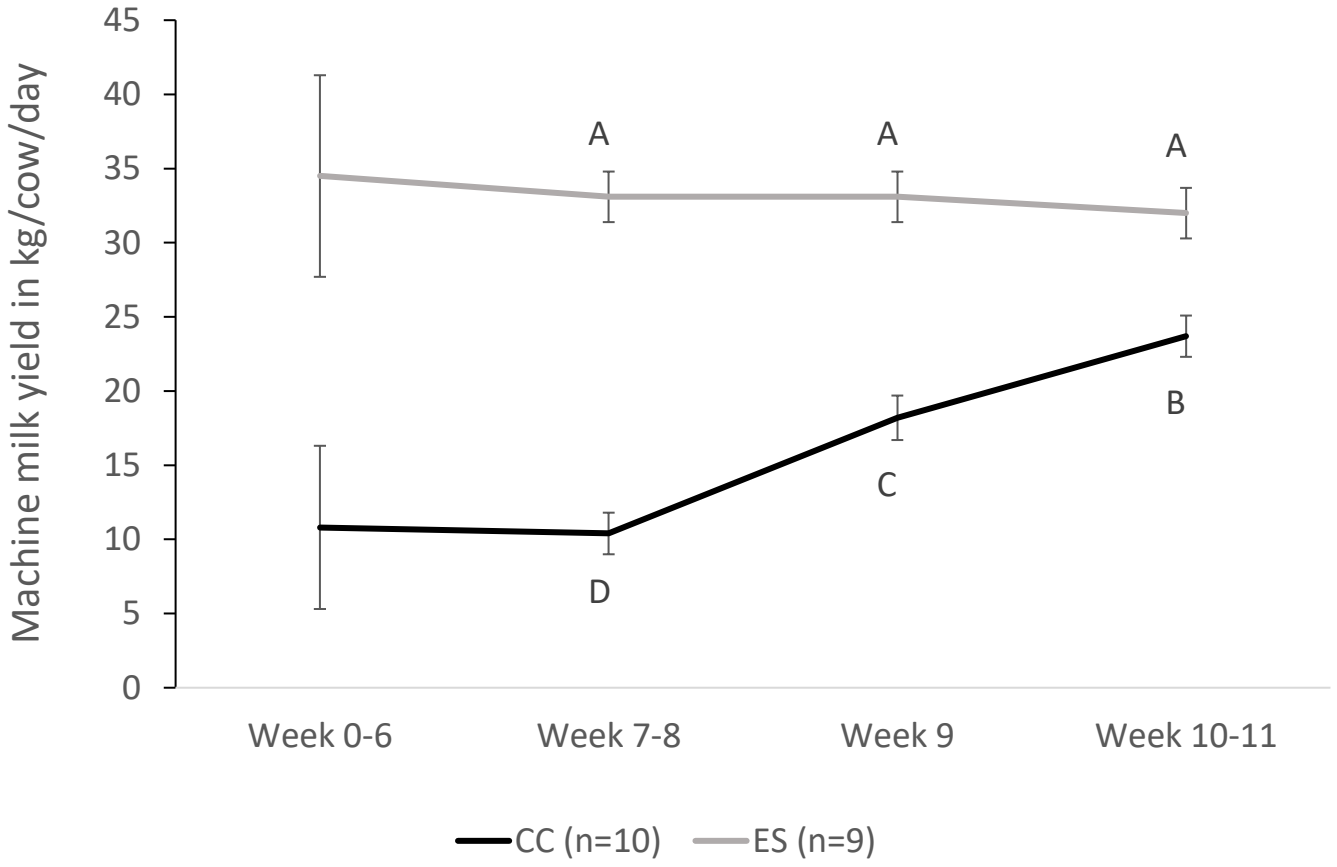
Cows machine milk yield

- Week 0-6: 10.8 vs 34.5 kg/cow/day
- Sign. difference during weaning, first separation week and afterwards



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Cows composition of machine milk

Week 5:

- No difference in fat (but low)
- Difference in lactose and ECM

Post-experiment (week 14-18):

- No differences

	Treatment		Treatment
a. Item	CC (n=10)	ES (n=9)	P-value
Fat, %	2.6 ± 0.2	3.3 ± 0.3	0.146
Protein, %	3.2 ± 0.1	3.2 ± 0.1	0.647
Lactose, %	4.5 ± 0.1	4.9 ± 0.1	**0.005**
Total solids, %	10.3 ± 0.3	11.5 ± 0.3	0.111
ECM/day, kg	7.8 ± 2.2	33.8 ± 2.4	**0.010**
FFA, mEq/L	0.14 ± 0.06	0.12 ± 0.07	0.810
Urea, mmol/L	2.3	2.6	0.693
SCC, 10^3/mL	85.2	127.7	0.360
b. Item	CC (n=8)	ES (n=8)	
Fat, %	3.9 ± 0.4	4.0 ± 0.4	0.944
Protein, %	3.6 ± 0.1	3.6 ± 0.3	0.536
Lactose, %	4.9 ± 0.2	4.8 ± 0.2	0.675
Total solids, %	12.3 ± 0.5	12.4 ± 0.7	0.977
ECM/day, kg	23.4 ± 4.4	28.4 ± 4.4	0.447
FFA, mEq/L	0.5 ± 0.1	0.7 ± 0.4	0.222
Urea, mmol/L	5.3 ± 0.4	5.9 ± 0.8	0.535
SCC, 10^3/mL	47.5 ± 56.3	191.3 ± 315.8	0.313

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Cows body weight and body condition

- Decrease in body weights
- Numerically higher in ES cows

		Treatment	
Item	Time	CC (n=10)	ES (n=9)
BCS, 1–5-point scale	First pasture day	3.9 ± 0.6	3.7 ± 0.7
	Week 9	2.9 ± 0.4	2.5 ± 0.5
Body weight, kg	First pasture day	657 ± 98	691 ± 47
	Week 9	603 ± 82	622 ± 50

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Results calf performance

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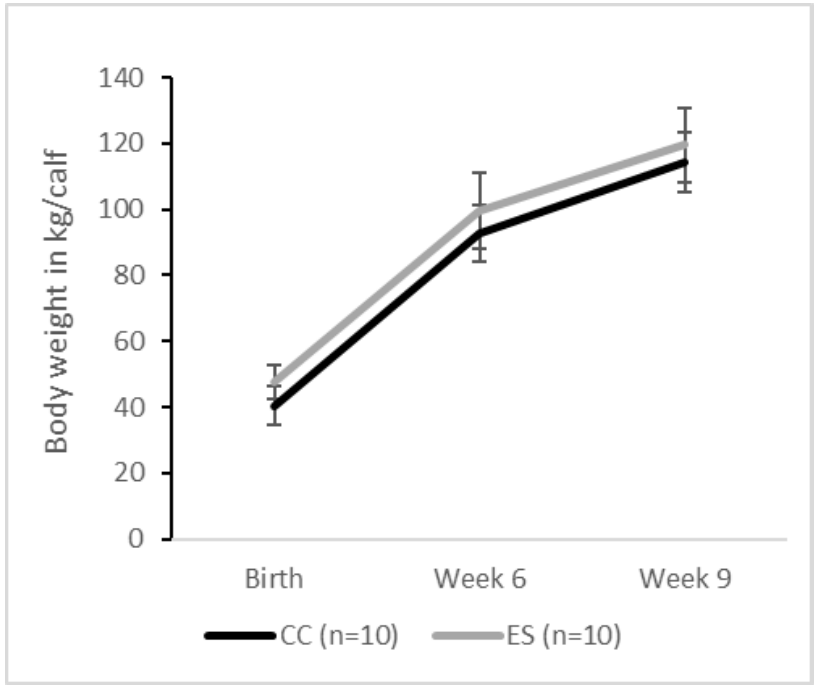
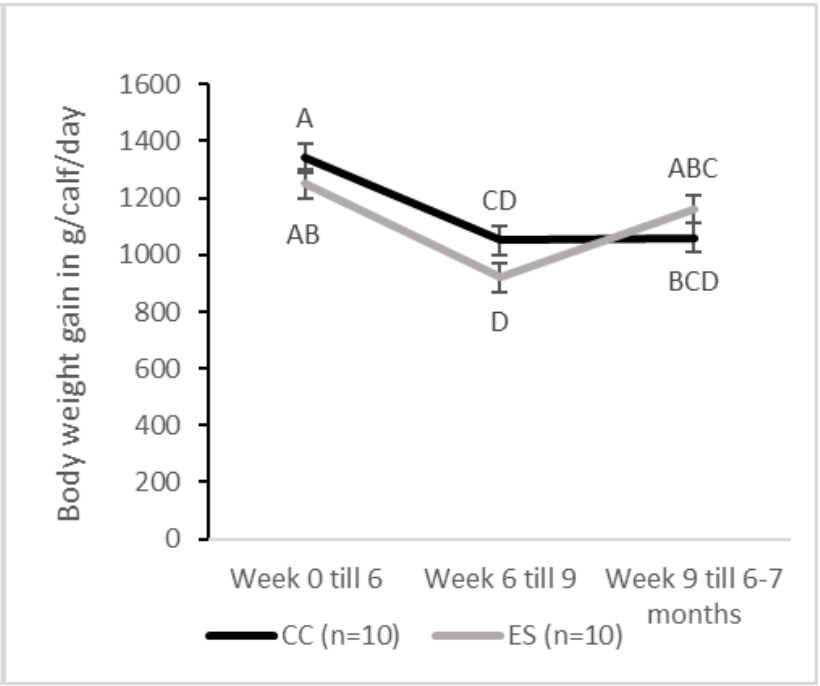
Calf body weight and body weight gain

Weight gain:

- 1.15 vs 1.11 kg/calf/day (CC vs ES)
- No differences within each period
- Decrease during weaning





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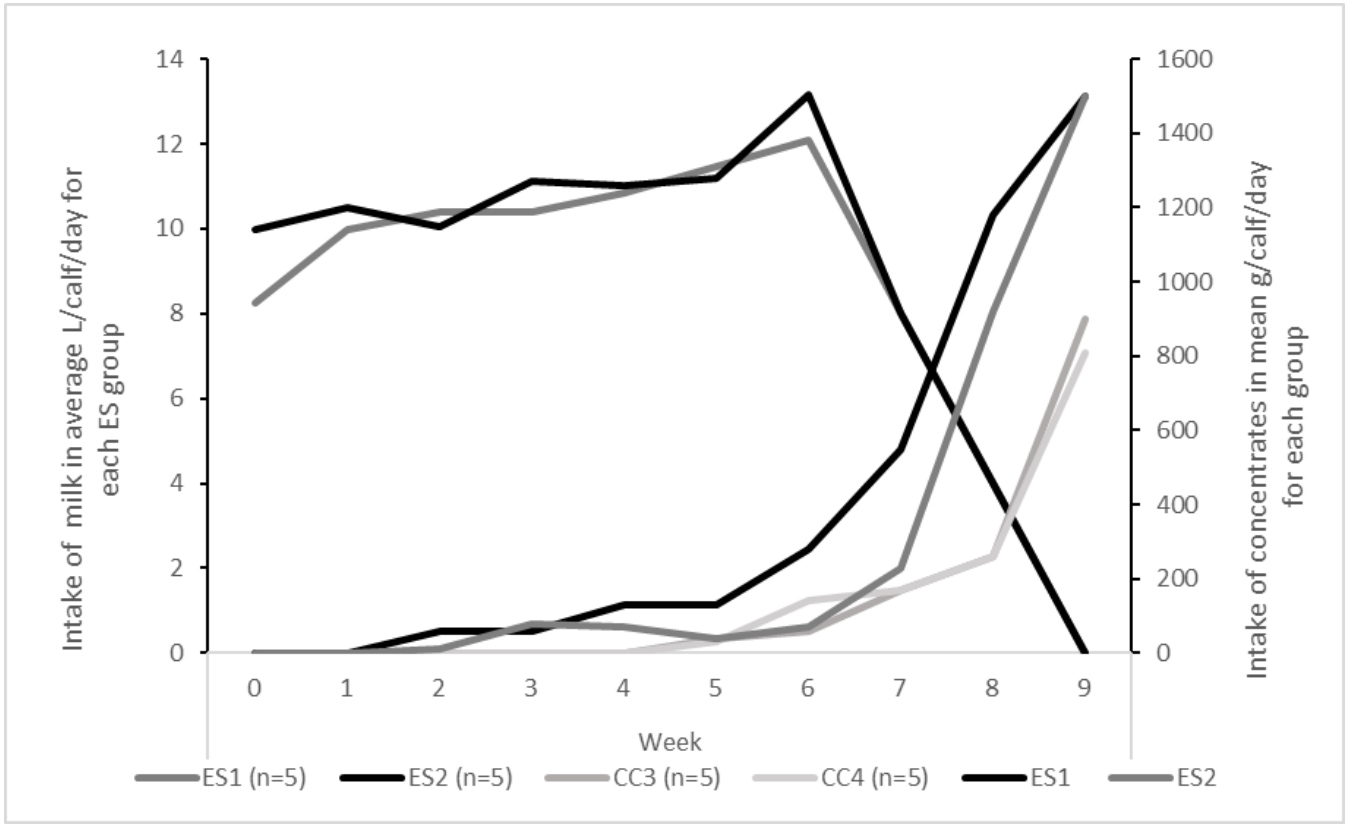
Calves' intake of milk and concentrates

- ES: Milk intake 10.7 L/calf/day week 0-6 (allowance 12-14 L)
- ES: Earlier and more concentrates



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Cow health

- Challenge: Inhibited milk ejection during milking in CC cows
- Especially three primiparous cows
- Prominent during weaning-separation
- Concerns about mastitis and prolonged lower milk yield – Oxytocin injections
- Only the two oldest CC cows considered to have normal milk ejection

	Treatment, group			
Health incidents	CC3 (n=5)	CC4 (n=5)	ES1 (n=4)	ES2 (n=5)
Respiratiry diseases	0	0	0	0
Foot and leg diseases	0	0	0	0
Indigestion/Diarrhea	0	1	4	2
Inhibited milk ejection, no.cows	3	5	0	0
Oxytocin, no. inj.	38	28	0	0
Oxytocin, before weaning (3 prim. cows)	32%	7%	-	-
Oxytocin, during wean. and sep.	68%	93%	-	-
Mastitis	1	2	1	1
Mastitis bacteria, no. glands	5	1	2	4
Mastitis, Penicillum inj.	0	2	1	0
Mastitis, Metacam inj.	0	2	1	0
Teat wounds	0	2	0	1
Teat wounds, Penicillum inj.	0	0	0	1
Udder injury	1	0	0	1

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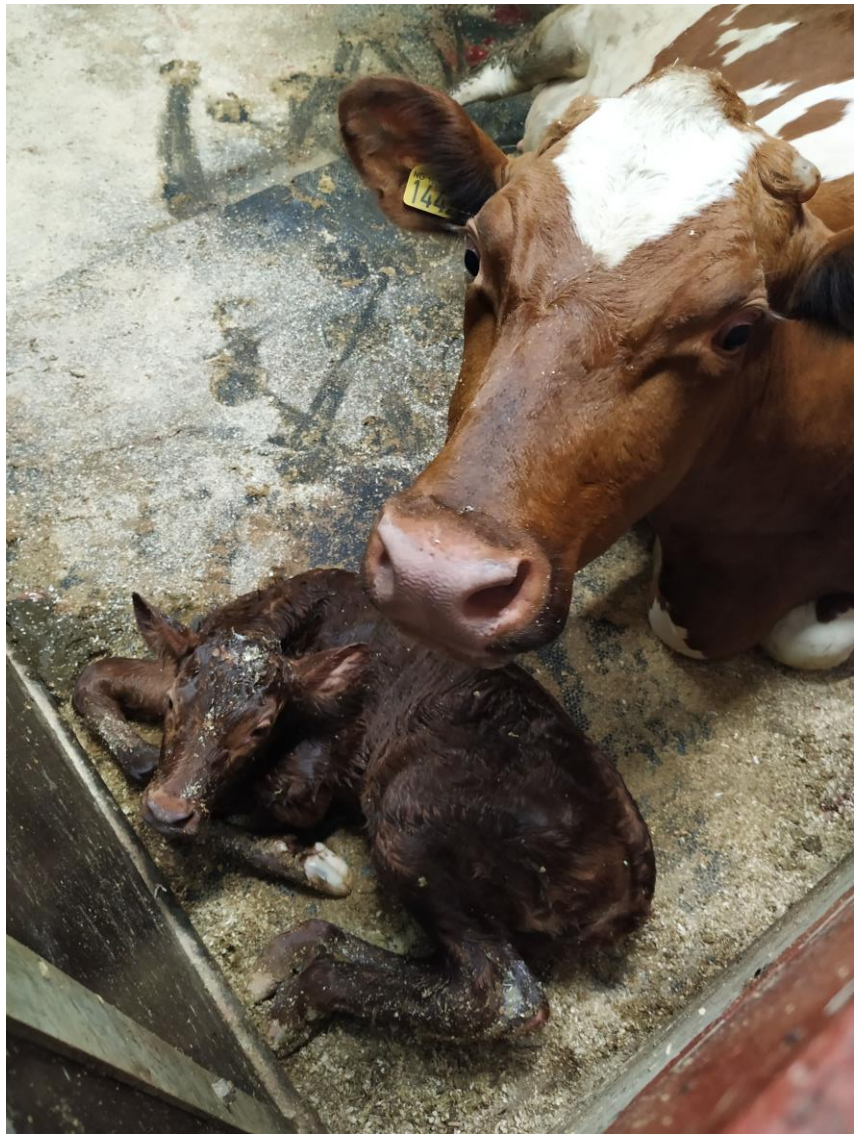
Calf health

- Some diarrhea in CC and ES (ES around weaning)
- Some coughing in ES2
- CC: Hairless/small wounds on front knees
- General conditions not affected
- Generally good health in all calves

Health incidents	Treatment, group			
	CC3 (n=5)	CC4 (n=5)	ES1 (n=5)	ES2 (n=5)
Ingestion/Diarrhea	1	3	5	5
Resp.symptoms	0	0	0	4
Foot and leg diseases	3	5	0	0

The discussion in the thesis?

- General discussion
  - Challenge to discuss interviews and experiment together?
  - CCC systems in Norway – Indoors and pasture
  - Compare about pasture and calf behaviour?
  - NORSØK report interviews – Some more about performance and health, can that be used?
- Methodological and ethical considerations
  - Limitations of the experiment
  - Stress in CC cows – inhibited milk ejection – oxytocin injections
- Future perspectives
  - Farmer income? (Part of SUCCEED as well)
  - Enhance milk ejection in CCC cows on pasture?
  - Reduce stress in primiparous cows and around weaning and separation on pasture?
  - Mobile milking robot on pasture?



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Thank you!

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