



American and German citizen attitudes towards cow-calf separation on dairy farms

EAAP 2016 - Belfast

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Introduction

- Increasing public concern about the welfare experienced by farm animals (*Kendall et al., 2006; Tonsor et al., 2009; Vanhonacker/Verbeke, 2014*)
- Knowledge-gap in the public is often cited as the culprit of critics
→ Information of society proposed as solution (*Driessen, 2012*)
- Consensus about targets and values between people from outside and inside agriculture often lacks (*Hansen et al., 2003*)
- To maintain the “license to produce“ public values should be considered in the design of production systems (*Te Velde et al., 2002*)
- Dairy farming is publicly perceived more positive compared to other species
→ but: some practices are also under discussion, e.g. separation of cow and calf immediately following birth (*e.g. Ventura et al., 2013*)

Introduction

Qualitative study by Ventura et al. (2013) examines arguments for early as well as later separation from experts and lay-people.

Six main themes regarding concerns for early and later separation:

1. Cow and calf emotions
2. Calf health
3. Dairy cow health and production
4. Natural life
5. Dissatisfaction with industry motives
6. Changeability of dairy farming structure

Introduction

- Reasons for early separation as stated by supporters (*according to Ventura et al., 2013*):
 - Emotions of cow and calf, e.g. later separation would lead to stress through destroying a stronger bond (*e.g. Flower/Weary, 2000*)
 - Better calf health e.g. through monitoring colostrum intake and lower disease transmission (*e.g. Marcé et al., 2011*)
 - Cow health and performance, e.g. withholding milk in the parlour or teats damage
 - Difficulties with changing the production processes

Introduction

- Reasons for a later separation as stated by supporters (*according to Ventura et al., 2013*):
 - Positive emotions of cow and calf through contact with each other (*e.g. Daros et al., 2014*)
 - Calf health, e.g. less diarrhea (*Weary/Chua, 2000*)
 - Cow health and performance, e.g. less mastitis (*Krohn, 2001*)
 - Changeability of production processes possible

Main research questions

1. When do citizens think that cows and calves should be separated in dairy farming (early or later)?
2. Can citizens be segmented according to their attitudes towards separation?
3. Does the provision of information through different arguments lead to a shift in citizens' opinions?

→ Online survey with 476 US and 491 German residents

Data collection and analyses

- Online survey with 476 US and 491 German residents
- Analyses using SPSS Statistics:
 - Factor analyses to explore attitude structures within the arguments (main component analysis with Varimax-rotation *according to Field, 2009*)
 - Cluster analysis with three-step procedure (single-linkage, ward-method and K-means procedure)

Study design

Short text explaining what early and later separation is about



Separation question 1 (before arguments): „What do you think when cow and calf should be separated?“



22 arguments for/against early and later separation build on results of Ventura et al., 2013



Separation question 2 (after arguments): „What do you think when cow and calf should be separated?“

Study design – Cluster building variables

22 arguments for/against early and later separation build on results of Ventura et al., 2013



Separation question 2 (after): „What do you think when cow and calf should be separated?“

Factor analysis with 22 arguments to explore attitude structures (main component analysis with Varimax-rotation *according to Field, 2009*):

- Factor 1: Considerations of the emotional life of cows and calves on farms
- Factor 2: Arguments favoring early separation: health, emotion and management
- Factor 3: Arguments favoring later separation: health, production and management

Three factors and separation question 2 (after arguments) → Cluster analysis with three-step procedure (single-linkage, ward-method and K-means procedure)

Research question 1:

When do citizens think that cows and calves should be separated in dairy farming?

Research question 2:

Can citizens be segmented according to their attitudes towards different arguments for both practices (early and later separation)?

Results – Evaluation of arguments in Clusters

	Cluster A (Pro later) (n=370; 38.7%)	Cluster B (Unsure) (n=417; 43.6%)	Cluster C (Pro early) (n=171; 17.9%)
¹ When should cow and calf be separated?***	-2.51 ^{b, c} (0.58)	-0.64 ^{a, c} (0.64)	1.58 ^{a, b} (0.75)
² F1: Emotional live***; CA = 0.77	1.72 ^{b, c} (0.80)	0.87 ^a (0.77)	0.75 ^a (0.91)
² F2: Arguments favoring early separation***; CA = 0.74	-1.08 ^{b, c} (0.82)	-0.15 ^{a, c} (0.64)	0.37 ^{a, b} (0.75)
² F3: Arguments favoring later separation***; CA = 0.68	1.37 ^{b, c} (0.70)	0.59 ^{a, c} (0.60)	0.34 ^{a, b} (0.82)
<p>¹ = Scale from -3 = „They definitely should be separated later“, 0 = „I am not sure“, +3 = „They definitely should be separated early“</p> <p>² = Scale from -3 = „I totally disagree“, 0 = „I neither agree nor disagree“, +3 = „I totally agree“</p> <p>Factor analysis: KMO=0.88; p=0.000; explained variance=54.8%.</p> <p>Differences between clusters are tested using ANOVA and Post-hoc tests (*** p ≤ 0.000).</p> <p>^{a,b,c}=letters indicate differences between clusters.</p>			

Results – Evaluation of arguments in Clusters

	Cluster A (Pro later) (n=370; 38.7%)	Cluster B (Unsure) (n=417; 43.6%)	Cluster C (Pro early) (n=171; 17.9%)
¹ When should cow and calf be separated?***	-2.51 ^{b, c} (0.58)	-0.64 ^{a, c} (0.64)	1.58 ^{a, b} (0.75)
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Factor analysis: KMO=0.88; p=0.000; explained variance=54.8%.

Differences between clusters are tested using ANOVA and Post-hoc tests (*** p ≤ 0.000).

^{a,b,c}=letters indicate differences between clusters.

Research question 3:

Does the provision of information in the form of arguments lead to a shift in participants' opinions?

Results – When should cow and calf be separated?

Participants who did not change their answer from `before` to `after`:

Cluster A (pro later): 71.1%

Cluster B (unsure): 42.1%

Cluster C (pro early): 55.0%

	Favoring later separation	Unsure response	Favoring early separation
Cluster A - Before	96.1%	2.4%	1.4%
Cluster A - After	99.5%	0.5%	-
Cluster B – Before	53.2%	27.3%	19.5%
Cluster B – After	54.4%	45.6%	-
Cluster C – Before	9.9%	8.8%	81.2%
Cluster C - After	-	0.6%	99.5%

Results – Cluster description

	Cluster A (Pro later) (n=370; 38.7%)	Cluster B (Unsure) (n=417; 43.6%)	Cluster C (Pro early) (n=171; 17.9%)
USA	43.0% ^c	50.4% ^{n.s.}	59.1% ^a
Germany	57.0% ^c	49.6% ^{n.s.}	40.9% ^a
Female participants	62.2% ^{b, c}	46.3% ^{a, c}	31.6% ^{a, b}
Parents	51.6% ^{b, c}	32.6% ^a	27.5% ^a
Differences between Clusters were tested using χ^2 -test and cross tabulation with z-test. Letters indicate significant differences between the Clusters ($p \leq 0,05$); ^{n.s.} =not significant ($p \geq 0,05$).			

Discussion

- Early separation of cow and calf is not supported by the majority of respondents (*Boogard et al. 2011; Ventura et al., 2013*).
 - But: heterogenous opinions are existent
 - Difficulties in evaluating how a socially accepted livestock farming should look like
- Presentation of different arguments slightly increases unsure responses but most participants kept their initial answers (confirmation bias; *Nickerson, 1998; Jonas et al., 2001*)
- There are both, advantages and disadvantages of an early separation of cow and calf
 - Complex situations lead to challenges in communication with the public (judgement conflicts, *Feindt et al., 2004*)
- Alternatives to an early separation should be on the agenda in dairy research

Thank you very much!



Appendices

Intro-Text

On dairy farms cows are kept for the purpose of producing milk for human consumption. In order to produce milk, **a cow needs to give birth to a calf** approximately once a year. **Once born, there are two main ways calves can be handled:**

1. The calf stays with the cow for some days or weeks and is then moved to a separate barn and there is no contact between cow and calf from then on (**“later separation”**).

OR

2. The calf is separated from the cow within the first few hours of birth and moved to a separate barn so that there is no contact between cow and calf (**“early separation”**).

Main theme: Subtheme	Original Quote	Arguments in the questionnaire
Cow and calf emotions: Bond between cow and calf	“The cow being a mother is supposed to have an emotional string attached to her calf...by no means having a lesser degree of recognition compared to a human mother” (p. 6109)	<ol style="list-style-type: none"> 1. The cow has an emotional attachment to her calf. 2. The attachment between cow and calf cannot be compared to that between human mother and child.
Calf health: Calf nutrition	<p>“There is no way to monitor for adequate colostrums intake if the calf nurses freely” (p. 6110) “Calves benefit from the care they receive from the cow (e.g. better access to milk and colostrums)” (p. 6112)</p> <p>“The cow produces colostrums which isn’t commercially saleable and the calf should have free access to this for the first couple of days at least” (p. 6112)</p>	<ol style="list-style-type: none"> 1. By allowing calves to nurse freely from the cow, the calf has better access to milk. 2. By separating cow and calf early, the farmer can ensure that the calf receives adequate colostrum (the first milk which is important for calf health).
Dairy cow health and production: Production	<p>“Allowing the cow to be with her calf certainly keeps her happy and content. I believe a happy cow produces more milk” (p. 6112)</p> <p>“The farmers than have to use oxytocin on the cow to force her milk to come out....cows can get very sick if they don’t release their milk” (p. 6112)</p>	<ol style="list-style-type: none"> 1. A cow that is together with her calf produces more milk. 2. If the cow nurses her calf, she won’t release her milk to the farmer.

Main theme: Subtheme	Original Quote	Arguments in the questionnaire
A natural life: <i>No subthemes available</i>	<p>“Nature tells us the cow is born to enjoy the companionship of her calf for a certain time and vice versa” (p. 6112)</p> <p>“...those calves separated early from their mothers are believed to have low socialization and [are] more stressed when mixed later with groupmates in a pen.” (p. 6112)</p>	<p>1. Nature tells us the cow enjoys the companionship of her calf for a certain time.</p> <p>2. Even when separated early from the cow, calves can develop normal social behavior.</p>
Dissatisfaction with industry motives: Wrong focus, profit motive	<p>“I think early cow-calf separation is practiced for the purpose of reducing labor management of the owner, not for the cow-calf wellbeing” (p. 6113)</p> <p>“Why can’t farmers treat the very thing that makes them so much money with some respect?” (p. 6113)</p>	<p>1. Early cow-calf separation is done to reduce labor for the farmer and does not consider the welfare of the calf and cow.</p> <p>2. Farmers treat their cows with respect because cows are their livelihood.</p>
Changeability of dairy farming structure: <i>No subthemes available</i>	<p>"If most of the problems around leaving the cow and calf together are a matter of environment, why not change the environment?" (p. 6113)</p>	<p>1. Farms that separate cows and calves early cannot easily change practices.</p> <p>2. Housing systems on dairy farms can be changed to maximize benefits for cows and calves.</p>

	Cluster A (Pro later) (n=370; 38.7%)	Cluster B (Unsure) (n=417; 43.6%)	Cluster C (Pro early) (n=171; 17.9%)
Pet owner	59.7% ^{b,c}	49.4% ^a	46.2% ^a
Pet relation (positive)	0,64 ^{b, c} (1.34)	0.27 ^a (1.34)	0.26 ^a (1.31)
Belief in cows mind	1.27 ^{b, c} (0.98)	0.86 ^{a, c} (0.99)	0.68 ^{a, b} (1.05)
Schwartz Value: Self-transcendence	-0.28 ^c (0.98)	-0.41 ^c (0.99)	-0.80 ^{a, b} (1.04)

	Cluster A (Pro later) (n=370; 38.7%)	Cluster B (Unsure) (n=417; 43.6%)	Cluster C (Pro early) (n=171; 17.9%)
Age***			
18-29	30.3% ^{b,c}	42.7% ^a	52.6% ^a
30-39	29.2% ^{n.s.}	28.3% ^{n.s.}	27.5% ^{n.s.}
40-49	18.6% ^c	15.3% ^{n.s.}	8.8% ^a
50-59	16.8% ^b	9.8% ^a	9.4% ^{n.s.}
>60	5.1% ^{n.s.}	3.8% ^{n.s.}	1.8% ^{n.s.}
Residency^{n.s.}			
Urban	32.2% ^{n.s.}	31.4% ^{n.s.}	34.5% ^{n.s.}
Suburban	44.3% ^{n.s.}	46.5% ^{n.s.}	44.4% ^{n.s.}
Rural (not on a farm)	21.9% ^{n.s.}	20.4% ^{n.s.}	20.5% ^{n.s.}
Rural (on a farm)	1.6% ^{n.s.}	1.7% ^{n.s.}	0.6% ^{n.s.}
Diet***			
No restrictions	86.5% ^{b,c}	92.1% ^a	94.2% ^a
No meat but fish	2.4% ^{n.s.}	3.8% ^{n.s.}	4.1% ^{n.s.}
Vegetarian	7.3% ^{b,c}	3.4% ^a	1.2% ^a
Vegan	3.8% ^b	0.7% ^a	0.6% ^{n.s.}
Connection to agriculture			
I am regularly in contact with agriculture through friends neighbors, hobbies etc.	29.5% ^b	19.9% ^a	22.8% ^{n.s.}
Someone in my family works in agriculture.	13.8% ^c	18.2% ^{n.s.}	22.2% ^a

Advantages and disadvantages of a later separation

	Advantages of a later separation	Disadvantages of a later separation
Cow Behavior	Possibility to express maternal care	Increased activity when separated Increased vocalisation when separated Decreased rumination when separated
Health	Less retained placentas Less mastitis	
Production	Milk production is not influenced by the presence of the calf Shorter calving intervals	
Calf Behavior	Less external suckling Less anxious with other calves Increased social activity Stronger maternal care when calving No „Negative Judgement bias“	Increased vocalisation when separated More anxious towards humans
Health	Less diarrhea Faster defecation and urination after birth Efficient colostrum intake	More diarrhea
Production	Higher daily weight gains	

*According to Flower und Weary, 2003; Roth et al., 2009;
Wagner et al., 2013; Daros et al., 2014;*

	Cluster A (Pro later) (n=370; 38.7%)	Cluster B (Unsure) (n=417; 43.6%)	Cluster C (Pro early) (n=171; 17.9%)
F1: Emotional life*** CA = 0.77	1.72 ^{b,c} (0.80)	0.87 ^a (0.77)	0.75 ^a (0.91)
The cow has an emotional attachment to her calf Kalb.*** (0.77)	2.03 ^{b,c} (0.97)	1.28 ^a (1.07)	1.11 ^a (1.27)
Cows and calves enjoy being together.*** (0.70)	2.12 ^{b,c} (0.89)	1.24 ^a (1.01)	1.12 ^a (1.12)
Cows and calves experience few emotions.*** (-0.69)	-1.65 ^{b,c} (1.20)	-0.68 ^a (1.25)	-0.47 ^a (1.44)
The attachment between cow and calf is different from that between human mother and child.*** (-0.68)	-0.97 ^{b,c} (1.63)	0.00 ^a (1.38)	0.08 ^a (1.59)
Housing systems on dairy farms can be changed to maximize benefits for cows and calves.*** (0.49)	1.81 ^{b,c} (1.08)	1.13 ^a (1.03)	1.12 ^a (1.08)
Scale from -3 = „I strongly disagree“, 0 = „I neither agree nor disagree“, +3 = „I strongly agree“			

	Cluster A (Pro later) (n=370; 38.7%)	Cluster B (Unsure) (n=417; 43.6%)	Cluster C (Pro early) (n=171; 17.9%)
F2: Arguments favoring early separation***; CA = 0.74	-1.08 ^{b, c} (0.82)	-0.15 ^{a, c} (0.64)	0.37 ^{a, b} (0.75)
Early separation reduces disease transmission from the cow to the calf.*** (0.70)	-0.98 ^{b, c} (1.36)	0.08 ^{a, c} (1.16)	0.40 ^{a, b} (1.23)
With later separation there is a risk that the cow injures the calf.*** (0.70)	-1.44 ^{b, c} (1.21)	-0.48 ^{a, c} (1.13)	-0.07 ^{a, b} (1.38)
It is better to separate cow and calf early because later separation is very hard on the mother.*** (0.65)	-1.00 ^{b, c} (1.32)	0.16 ^{a, c} (1.23)	1.32 ^{a, b} (1.36)
The calf's suckling can damage the cows' teats.*** (0.64)	-1.40 ^{b, c} (1.26)	-0.59 ^{a, c} (1.19)	-0.18 ^{a, b} (1.38)
By separating cow and calf early, the farmer can ensure that the calf receives adequate colostrum (the first milk which is important for calf health).*** (0.58)	-0.88 ^{b, c} (1.55)	0.06 ^{a, c} (1.19)	0.53 ^{a, b} (1.29)
For farms that separate cows and calves early it is hard to change practices.*** (0.42)	-0.78 ^{b, c} (1.43)	-0.11 ^{a, c} (1.17)	0.19 ^{b, c} (1.33)
Scale from -3 = „I strongly disagree“, 0 = „I neither agree nor disagree“, +3 = „I strongly agree“			

	Cluster A (Pro later) (n=370; 38.7%)	Cluster B (Unsure) (n=417; 43.6%)	Cluster C (Pro early) (n=171; 17.9%)
F3: Arguments favoring later separation; CA = 0.68	1.37 ^{b, c} (0.70)	0.59 ^{a, c} (0.60)	0.34 ^{a, b} (0.82)
A cow that is together with her calf produces more milk.*** (0.65)	1.14 ^{b, c} (1.08)	0.47 ^{a, c} (0.93)	0.20 ^{a, b} (1.22)
Frequent suckling helps to prevent common cow diseases.*** (0.64)	1.18 ^{b, c} (1.10)	0.41 ^a (0.90)	0.35 ^a (1.06)
An early separation does not improve calf health.*** (0.59)	1.35 ^{b, c} (1.57)	0.45 ^a (1.12)	0.30 ^a (1.27)
Early cow-calf separation is done to reduce labor for the farmer and does not consider the welfare of the calf and cow. *** (0.59)	1.28 ^{b, c} (1.41)	0.49 ^{a, c} (1.09)	0.16 ^{a, b} (1.27)
By allowing calves to nurse freely from the cow, the calf has better access to milk.*** (0.57)	1.92 ^{b, c} (1.11)	1.14 ^{a, c} (1.05)	0.68 ^{a, b} (1.36)
Scale from -3 = „I strongly disagree“, 0 = „I neither agree nor disagree“, +3 = „I strongly agree“			