



# SOLID participatory research from Denmark: Dairy calves suckling milking cows during the first part of their lives

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**August 2015**

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This work was undertaken as part of the SOLID Project (Agreement no. 266367 (<http://www.solidairy.eu/>), with financial support from the European Community under the 7th Framework Programme. The publication reflects the views of the author(s) and not those of the European Community, which is not to be held liable for any use that may be made of the information contained.

## Summary

A case study observing the cow-calf rearing was carried out to explore how one Danish dairy farmer managed to keep his calves with the milking calves during 1-4 months of their lives. The farm had about 50 crossbred cows. The farm is autumn calving from August to November and sold about 6500 kg milk per cow. Milking cows and heifers had access to outdoor areas. Calves were fattened until slaughter on the farm. The farm had a strategy of extensive farming and was also working actively on health improvements and on phasing out of antibiotics.

The cows give birth in a common calving area, outdoor or indoor. Cow and calf are transferred to a separate box to bond, and machine milking happens from the second day. Together, they will typically be first included in a smaller group of cows and calves, and then a bigger group, where cows and calves are together between morning milking and until after evening milking (of the others without suckling calves). All suckling cows are milked in the morning, and not in evening when they have been with their calves during the whole day. Cows produce more milk than what their own calf can drink, and therefore the numbers of calves and cows are balanced so that there is no milk left for evening milking. This means that not every calf had his/her mother in the cow-calf-area. The 'best suited' cows are gradually selected to become suckler aunts for the calves without their own mothers. Approximately 20 calves stay with 12 cows per area. By the end of December, the cows and calves – now between 1 to 4 months of age - are separated abruptly: the cows are not going back to the calves after morning milking. In 2013, fence line separation was tried out and proved to be successful. Bull calves often stay longer with suckler aunts.

This study was supported by interviews and visits in six Dutch systems which all kept calves with their mothers in the dairy area.

The design of the housing system needs to be considered carefully: minimum metal bars, corners, narrow places and blind ends, and maximum overview, space to move and equipment for the calves like lower water troughs and feeding tables which they can reach.

The visited Dutch farms demonstrated that skills and adaptation to the herd conditions is paramount for the success of this system, and it requires observation and knowledge of cow and calf behaviour, as well as quick action and reaction to all observations made. The Danish farmer had developed the system over a 20 year period, whereas the British farmer who did not have much prior experience was running into a lot of challenges. All the interviews in The Netherlands also supported this. So: start carefully and make sure that there are time for observations, actions and interactions, and room for constant adjustments. The people taking care of the herd should be highly attentive and ready to interact! It is wrong expectation that humans do not need to do much because 'cows care for the calves'.

Bonding should be ensured from early start and the biggest challenge in the cow-calf system is clearly the de-bonding process, and to a lesser extent also the bonding. Further literature studies suggest different ways to meet some of the challenges of creating bonds between cows and their calves, as well as to de-bond at weaning.

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The project was co-funded by the Danish Fund for Organic Research ('Fonden for Økologisk Landbrug') with 'Organic Denmark' as main applicant to follow the herd during a half year period and conduct farmer workshops on the topic, and the Danish Animal Protection Organisation 'Dyrenes Beskyttelse' to describe the system and its animal friendly perspectives.

## 1 Aims and Research question

The aim of this research was to give a basis for determining whether and under which circumstances letting calves stay with their mothers (or for some calves, suckler aunts) in a suckling system during the day hours can be a practical and animal friendly way of rearing calves:

- Does it meets natural needs of calves and cows, and how?
- Does it have positive or negative effects on animal growth rate, health and welfare and milk production?
- What should be considered regarding management in such a system?

This piece of research took its starting point in a smaller Danish dairy herd with 49 cows per year with seasonal late-summer / autumn calving, where a cow-calf suckling system had been developed over the last two decades. The research included the following parameters:

- available milk for sale / estimated milk per calf per day
- calf growth rates
- health implications for cows and calves
- management challenges, and the solutions to these
- cow-calf behaviour

This was combined with a research-visit to 6 Dutch dairy herds including informal farmer interviews about their practical experiences regarding letting calves suckle their mothers in loose housing systems with even calving pattern throughout the year.

## 2 Background

### 2.1 Farm Background

The farmer couple had practiced cow-calf system almost since they bought this farm, 20 year prior to the study. It is a relatively small farms characterised by the following:

- an average of 49 cows per year,
- all calvings during August-November
- about 6500 kg milk per cow
- access to outdoor areas for cows in the milking cow area, and heifers
- crossbreeds jersey, RDM (red Danish) and SDM (Danish black and white)
- bull calves fattened until slaughter on the farm
- strategy of extensive farming and phasing out of antibiotics through health promotion

### 2.2 Research Background

Keeping calves with their mothers is probably the rearing system which allows most cow-calf interaction and meets the natural needs of both cow and calves, in a dairy farming system. It is rarely practiced under Danish production conditions, for different reasons: it can be practically difficult to manage, and it will probably reduce the milk for sale quite significantly. However, in the organic principles, letting animals meet their natural needs is highly valued as a quality and as a part of animal welfare. The alliance between humans and animals is based on the combination of allowing the animals to express their natural behaviour and have their natural needs met as much as is possible under domesticated conditions, and at the same time, that humans take the responsibility to interfere and take over when it is needed. To find the balance and 'when it is

needed' is a challenge, which needs to be identified and met in each context, and which requires a great deal of learning.

The motivation for taking this piece of research up as a farmer innovation was that more farmers are curious towards the system and acknowledge its potentials to meet animals' needs which is emphasised in the organic principles. However, many also reject the idea because of the milk loss and the difficulties in managing such a system, including e.g. perceived risks of damaging the calves. In this particular farm, the system has been practiced in different forms over the last 20 years and therefore offers a great learning regarding how to manage it in a smaller herd and with calving seasons.

In the Netherlands, more farmers practice the system in different ways, which has been explored by among others Wagenaar et al (2007) and Verwer & Kok (2012). To support the study in the Danish herd, the research team involved in this research also went on a short study trip to The Netherlands and visited 6 dairy farmers who practiced a cow-calf rearing system in dairy herds, to interview them about practical implications and management.

### 3 Methodology and data collection

#### 3.1 Location of the farm

'Svanholm', Brønderslev, Denmark.

#### 3.2 Monitoring of farm records and data collection

The table below summarises the type of data and the methodology of data collection. The data was collected between August and December 2013.

Parameter	Method	Frequency of data collection
Milk yield	Recorded in parlour electronically	Every morning (the cows were only milked once per day)
Calf measures	Using a weight at birth. Weigh tape	Every 2 weeks.
Measures of one year heifers	Weigh tape	Once
Disease treatments (cows and calves)	Danish central cattle data base	When events occur
Non-medical disease treatments	Herd book	When events occur
Feed use – for cows and calves	Farm records; observations of feeding troughs	Once; observations at every fortnight visit
Time registration during a work day	Walking after the farmer one whole day	One full day
Human-animal interaction	Fear test of 1 year heifers	Once; 14 heifers
Cow and calf behaviour	Observations of interactions, suckling and positions of cows and calves in relation to each other.	Two full days 7.30-15.30.

### 3.3 Research team involved

This research was a combined effort with funds from different sources involved to follow this herd, explore the potentials of this type of system, and bring it into debate under Danish organic dairy conditions. Apart from the farmer, Henrik Petersen, who was a milk producer to the Thise dairy company, Organic Denmark had funds and were involved with cattle health advisors Thorkild Nissen and Birgitte Hemmingsen. Aarhus University was involved with senior researcher Margit Bak Jensen who was an expert in ethology of calves, and senior researcher Mette Vaarst (partner in WP1 in SOLID). In the Netherlands, Gidi Smolders from orgANIMprove organised the study trip, and he and Cynthia Verwer from Louis Bolk Institute were involved in an experience exchange meeting. A number of Danish farmers plus representatives from Thise Dairy Company were involved in a 'future workshop' based on the observations in Henrik Petersen's farm and The Netherlands.

### 3.4 Time scale

Systems description conducted in June 2013. Data collected between August and December 2013 every fortnight, and 2 semi-structured research interviews conducted in the same period about choices related to making the system work. Study trip to the Netherlands conducted 11<sup>th</sup>-12<sup>th</sup> November 2013.

## 4 Results and Discussion

### 4.1 How the system works

The cows give birth to the calf in a common area, outdoor or indoor as it chooses itself. The cow and calf will then be transferred to a separate box to build up the bond between them, and to relax after the calving. If it was a complicated birth, or birth of twins, the cow and calf will stay in their own box for longer time. The cow will normally not be milked during the first day, but start on the second day. If the calf has not been observed suckling or there is a suspicion that it has not had sufficient amount of milk, it will be offered milked-out-milk. After this, they normally have a box where few cows and their calves go for some time, where they are under special observation. Then the little group will be included in a bigger group.

The system works in the way that cows and calves are together between morning milking and until after evening milking. The suckling cows are milked in the morning, and not at the evening milking when they have been with their calves during the whole day. To avoid evening milking, it means that the amount of suckling calves and litres of milk available has to be balanced, because not all calves will then have their own mother with them in the cow-calf-area. The farmer will start selecting which cows should stay with the calves, and which should go into the milking herd of cows being milked twice per day. He selects them based on their behaviour towards the calves: if there is any sign of aggressive behaviour or sign of lacking interest for the calf, she is taken out of the cow-calf-group. This means that approx. 20 calves are staying with 12 cows. There are at least three areas which can be in use, and the sizes of the different groups depend on the size of the area in combination with size of calves and temper of all the animals. Other factors that may be considered can be presence of disease (in particular Johne's disease and Salmonella which was present in the herd 2004-2006), ability to lay down milk at machine milking, or whether they are on the list of cows that must leave the herd for one reason or the other. If they are separated from the calves because of temper, they will always get a second chance in the following year. The farmer may help the 'left-

alone calves' to find suckler aunts which are willing to adopt them, but often they find their own ways; they are used to suckle, and quick and persistent, so they 'steal' when the cow's own calf start suckling.

By the end of December, the cows and calves will be separated. Normally, it happens abruptly: the cows are not going back to the calves after morning milking. Since they are used to be only part time together, there is not so much 'panic', but still, some calling (sometimes much!) no matter of the age of the calves. The calves will be between 1 and 4 months old, and some of them are already almost weaned because they have started eating a huge amount of silage and hay, and others will be fed from a teat bucket. This means that some calves are only staying in this system during a month, and others during an extended milk feeding period. After weaning they have silage, hay and some concentrate until grazing from the following spring.

This year, based on the results of the interviews of Dutch farmers, this farmer chose to try fence line weaning, where cows and calves are on each their side of a fence and can see and touch each other and during the first days suckle through the fence. This worked well.

Bull calves will often have some extra time with suckler aunts that are meant to be culled after the suckling period. Sometimes the bull calves go with the grown-up cows until they are 1 year old and being slaughtered.

#### **4.2 Results in study herd 2013**

There were no stillborn or dead calves in 2013, and no assisted calvings. The calves had an average birth weight of 35.3 kg. No peri-partum complications in terms of retained placenta or milk fever.

There were no treated diseases among cows or calves during the study period (vet or farmer treated), and there were no observed cases of disease at any of the research observation days, or reported by the farmer. (Historic data showed 5 cases of pneumonia and one case of diarrhoea in the period between 2008 and 2013). Almost all slaughtered animals from the farm have traces of liver flukes in their livers.

All calves followed a weight curve above the standard average, except one which was from a Jersey bull. The weight gains were generally a bit lower (not significant) among the youngest calves, compared to the first born. This could indicate that the 'big and old calves' were stronger and simply took more milk than the smaller and younger ones, which in some cases maybe were outcompeted. It could also indicate that they just took advantage of having more available milk during the first weeks, where there were still more cows in the cow-and-calf-area. The calves which had their own mother during the whole period, generally became bigger than the calves which partly suckled 'aunts'. The heifers from 2012 were also weighed at an age of 11.8 years. Their average weight was about 300 kg, which is quite much, given that half of them had Jersey fathers. It could indicate that they continued to grow well, and in combination with the fact that they never became sick, they probably had a steady growth curve.

The bulk tank SCC was 327.000 during the study period.

The calves were observed eating roughage within the first weeks of life, often together with their mother or other grown up cows.

Milk intake was estimated based on the morning milking to be 5.26 litres/calf/day, which seemed very little. Given the weight gain of the calves, probably underestimated.

Farmer time spent taking care of the cow-calf system was observed through one day, where the observer followed him around on the farm. On that day, 80 minutes were spent with cows and calves in the system, distributed between the following activities:



- |  |         |
|--|---------|
| - Collecting cows for milking and bringing them between calves and milking | 16 min  |
| - Feeding the calves   | 13 min  |
| - Straw supply   | 20 min  |
| - Talking and padding the calves and cows                                  | 28 min  |
| - Helping calves to get milk   | 3 min   |
| - In total   | 180 min |



The 'talking and padding' periods can be while talking in mobile phone or waiting for the water troughs to be filled.

Fear tests were performed at 14 heifers in a group, to see if they seemed wilder than 'normal heifers'. One heifer walked away at a distance of 2 metres, and 4 allowed the farmer to go as close as he could pad them behind their ears. The rest allowed him to come between 0.5 to 1.5 metres.

Cows and calves were observed during two full days. A wealth of detailed info was recorded, and it all gave witness of a highly complex dynamic pattern between cows and calves, which is difficult to summarise shortly but the following points are found relevant to highlight:

- Calves suckled their mother in a 'reverse parallel position' where their bodies were parallel,
- Calves suckled aunts generally in a 'stealing position' between their hind legs, with few exceptions; there was e.g. one cow which seemed to be a favourite cow for many calves, and one small calf that seemed to be easily adopted by more cows which allowed it to stand parallel.
- Young calves generally only suckled



their mothers; a bit older calves could cross-suckle also when their own mother was present, although not so often. E.g. one twin suckled generally quite a lot from other cows than its own mother, whereas its twin seemed closely connected to the mother.

- Young calves seemed to rest more close to their mother, where older calves went into a calf group and slept together as a group. Mothers of young calves also seemed more protective to them, and attempted to keep them closer.
- When 'feeding and milking sounds' started, the calves would start suckling because they know that now their mothers/aunts will soon leave.
- The calves seemed to enjoy when the mothers / aunts leave at the evening milking, because it gives space to running and playing. The cows seemed happy having a bit of evening concentrate and being able to be with the other cows and have outdoor access. In the morning, both groups seemed to enjoy getting back together.

### 4.3 Summary of interviews and study trip to The Netherlands



We visited 1 farm where cows and calves were together 1½-2 hrs after each milking, and five farms where the calves were part of the milking herd night and day, although in some of the herds, the calves were kept inside when the cows walked to the pasture, for security reasons (e.g. a motorway close to the farm). In most farms, the bull calves were sold off at an age of 3 weeks. Heifer calves were normally with their mothers until an age of about 2-3 months. The experiences pointed among other to:

- Bonding should be ensured from the very start, but was normally not a problem. Some had the cows and calves isolated in a calving box for few days before they were let into the milking herd, others just kept a close eye to them. It was normally uncomplicated, although some had to be helped suckling in the start. It was paramount to ensure that it worked well within the first day or two, no matter which system was applied.
- The major challenge was the process of de-bonding. One farmer let the calf stay with its mother but with a 'nose-ring' that hindered suckling. Others made various versions of fence-line weaning, meaning that the calf had to suckle through a fence, which limited it and made the calf more aware of presence of humans – who then should make positive contact to the calf and feed and pad it, and of other calves. It would be an advantage to have more calves together.

- Most herds had even calving pattern throughout the year, which on one hand could be a challenge for the 'peace' in the herd – both in the calf group and the cow group, and with regard to behaviour as well as hygiene issues. On the other hand, seasonal calvings would require quite a lot of extra space used only during one period of the year.
- The design of the housing system needs to be considered carefully: minimum metal bars, corners, narrow places and blind ends, and maximum overview, space to move and equipment for calves like lower water troughs and feeding tables which they can reach.
- A special area for calves, unreachable for cows, could be desired, but only few had it.
- The very young calves preferred often to stay with their mothers – sometimes they walked with them to the slatted floor areas and were lying there while the mother was eating. Solutions to this as to offer mothers of young calves feeding in a more 'calf friendly' area were not really developed.
- Calves normally preferred to eat of the feed offered for the mothers. The farmers would offer calves special calf concentrate, but the calves would still prefer the cow feed.
- The learning element in systems where calves were allowed to be together with grown-up cows, was emphasised by all farmers. They had made observations which made them think that the calves were much better equipped to come into the cow system when they grew up, which could be explained by them being 'used to the system' from a young age. They ate roughage and had social contact with fellow calves and grown-ups, which also gave them a good start as ruminants and as social animals.
- The calves could have diarrhoea caused by 'overdrinking', and it was seen occasionally but was not regarded as life threatening.
- All farmers had experienced to have a calf that was damaged or had died, but it was a very rare. One farmer consequently took out cows in heat from the herd, and others emphasised the design of the housing system.
- With regard to milk consumption and weight, they all realised and accepted that the calves drank much more milk this way, than when being restricted in a twice-a-day-milk-feeding program, but they were also less ill and their weight curves were normally about 1½ in front of their age.

## 5 Conclusions/Recommendations

- Observations in the Danish dairy herd during one calving and calf rearing season showed positive results regarding calf and cow health, animal behaviour and daily management.
- It was clearly demonstrated that skills and adaptation to the herd conditions is paramount for the success of this system, and it requires observation and deep knowledge of cow and calf behaviour, as well as quick action and reaction to all observations made. The interviews in The Netherlands supported this, and
- The biggest challenge in the cow-calf system is clearly the de-bonding process, and to less extent also the bonding. Further literature studies suggest different ways to meet some of the challenges of creating bonds between cows and their calves, as well as to de-bond at weaning (see suggested literature below).

## 6 References

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