



## Intensive Calf Feeding

The way to better performance and higher income.



H&L Milk taxi

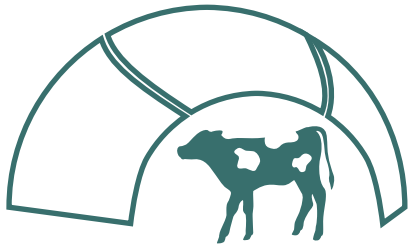


H&L 100 with HygieneStation



H&L Igloo Veranda

**8%**  
Less Space  
for Young  
Animals



A decrease of the first calving age by one month reduces the required places in the calf barn by 8 percent. Due to a longer lifespan of the cows (replacement rate from 30 percent to 26 percent), an additional 12 percent of places for young animals are saved.

Source: Robert B. Corbett; Calf and Heifer Congress 2015

**\$60**  
less Rearing  
Costs

The rearing costs for a heifer add up to an average of \$2,000. Each saved month in rearing reduces the costs by approx. \$60 per heifer.

Source: Evaluation of German dairy consulting association in Schleswig-Holstein



**\$10**  
Savings due  
to Weaning by  
Weight

Faster growth and savings on feeding costs can be achieved, when controlling the weaning curve depending on the calf's individual development and by using an animal scale.

Source: Dr. Bernd Fischer, LLG Iden, Sachsen Anhalt, 2003

**~1500 lbs**  
more Milk



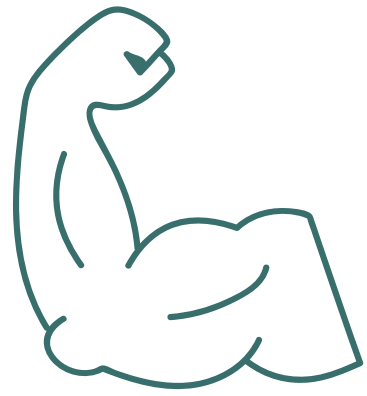
Intensive Feeding of the calves results in a rise of the milk yield during the first lactation period. According to twelve international studies, the average performance advantage adds up to ~680 kg.

Source: Dr. Kunz, LWK Schleswig-Holstein





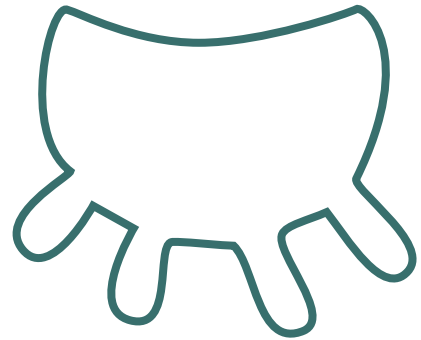
**1/2**  
Sick Days



Feeding a high amount of milk results in tougher calves. Diarrhea and the duration of the disease are reduced by more than a half.

Source: Schuldt und Dinse, 2017

**3 x**  
more Udder  
Tissue



According to two independent studies, the calf develops three times more udder tissue, when fed with a high energy level during the first eight weeks of life.

Source: Brown et.al. 2005, Soberon et.al. 2017



**+23,100 \$**  
profit with  
200 cows



Considering the above mentioned advantages, a farm with 200 cows and an annual offspring generated an additional profit of \$23,100 USD through intensive calf rearing.

Example calculation for a farm with 200 cows and an annual offspring of 60 heifers	
Additional costs for intensive feeding (+35)	\$2,100
Lower veterinary costs (appr. -\$15)	+\$900
Lower first calving age (1-2 months), lower rearing costs (-\$90)	+\$5,400
Higher milk yield of 500 liters (contribution margin after deduction of the feeding costs 0,\$15=\$75)	+\$4,500
Lower replacement rate from (30% to 26%); -12% rearing costs (\$2,000 x 12% = \$240)	+\$14,400
<b>Additional profit through intensive and healthier calf rearing</b>	<b>+\$23,100</b>

# Higher milk yield through early metabolic programming

The calf is still “immature” when it is born into the world, and many organs are not yet fully developed. For example, computer tomography scans have found that full maturation of the lungs takes about three weeks<sup>1</sup>. All of the other organs likewise show strong development of the cellular tissue in the first few weeks of life. If the development of the calf is supported by providing more than the previously recommended amounts of energy and a better supply of nutrients, these organs develop even better and form the basis for good performance and a higher milk yield later on.



When the organism is exposed to a high energy pulse for a certain period of time during its early life, insulin is released, which is necessary for a highly efficient body. Interestingly, however, there is a kind of memory effect in the body’s **metabolism**. If the high energy supply is stopped (e.g. in the case of heifers, in order to prevent too much adiposity), but then resumed at a later time (e.g. intensive feeding of the cow during its first lactation period), the body “remembers” its **programming** from earlier and is able to optimally support the metabolic processes of the body by producing a high volume of insulin.

Several studies during the last few years have shown that intensive feeding of the calves and even an oversupply of energy can result in a stronger growth, a lower first calving age by 1-2 months and a higher milk yield of approx. 1100 lbs.

## Calf Feeding Redefined

In view of all this, we need to rethink the approach to calf feeding.

1. Feeding parameters must be adjusted to the individual needs of the calf, using precise and individually adapted feeding curves.
2. Calf feeding until the calf is weaned from milk is divided into two phases:
  - A. **Start phase:** intensive feeding at the time of organ maturity (first 28 days of life)
  - B. **Weaning phase:** to support the calf’s development into a ruminant animal

## Everything starts with colostrum

Every farmer knows that the supply of colostrum for newborn calves is critical. But since the timing of a birth can never be precisely planned, providing good initial care for the calves is always a big challenge.

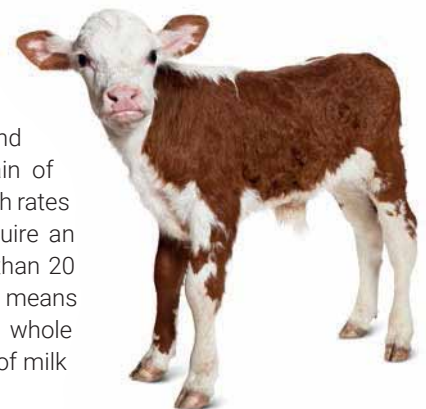


When the calf is born, it is essential to ensure maximum sanitation and hygiene and avoid infections. But there is much more to it: to develop a good immunity, the calf must consume more than 200 g of immunoglobulin IgG within the first hour of life. Since it should be assumed that only about 40% of the milk from the first milking has an IgG content of more than 50 g IgG per litre, the calf must drink over 4 litres of milk right after birth – and it has to be high-quality milk. Studies show that calves which have been fed this way are more robust and produce more milk later on. For example, Faber et al. found that calves that drink 4 litres of colostrum produce more milk later as grown-up cows (1st lactation + 950 kg, 2nd lactation + 1,650 kg)<sup>2</sup>.

## How much energy does the calf have to ingest?

According to dietary tables of the German Agriculture Association DLG, a calf with 50 kg body weight and daily growth of 400 g requires approximately 15 to 16 MJ ME per day. This corresponds to approximately 6 litres of whole milk or 1,000 g of milk replacer per day.

However, when the above-mentioned metabolic effects are taken into account, a 400 g daily weight gain is not sufficient. In its Gold Standards, the American DCHA (Dairy Calf and Heifer Association) states that the goal should be a doubling of the body weight until the time the calf reaches weaning at eight weeks, and thus a daily weight gain of 1,000 g. However, growth rates of 1,000 g per day require an energy intake of more than 20 MJ ME per day, which means more than 8 litres of whole milk or at least 1,250 g of milk replacer per day.

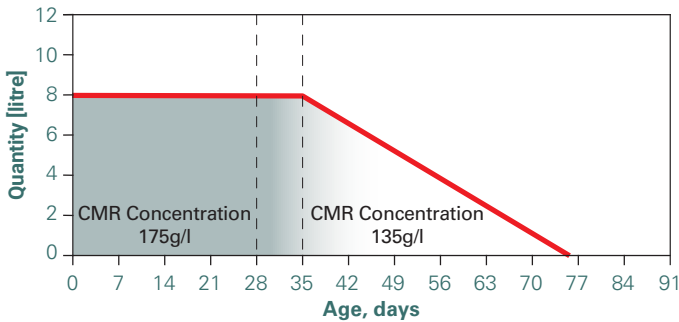


<sup>1</sup> Dr. Bernd Linke, 18273 Güstrow, Germany

<sup>2</sup> Faber, S. N. et al., University of Arizona, The Professional Animal Scientist 21 (2005), 420-425

## Metabolic feeding curve in the automatic feeder H&L 100 for better performance

This feeding curve foregoes a gradually increasing feeding phase and instead feeds 8 - 10 litres of milk per day during the start phase. In this case, the farmer accepts that the calves may not retrieve and consume the entire amount at the beginning. The concentration starts with 175 g CMR/l. The daily intake of CMR in the first start phase is 1,400 g and higher. This enables the calves to achieve a daily weight gain of 1,000 g and more! With this high supply, the calves convert additional CMR quantities into body mass at the ratio of 1 kg CMR: 1 kg!



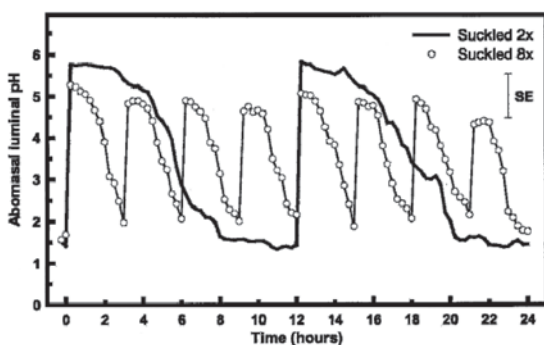
### Metabolic feeding plan at the automatic feeder H&L 100

The "metabolic feeding curve" starts the weaning of the calves with an early reduction of CMR concentration. This ensures that the calves are prepared early on for the intake of concentrate feed. This process marks the start of the weaning phase. The amount of energy supplied is slowly reduced, which motivates the calves to satisfy their hunger pangs by consuming dry feed. In addition, the calves still continue to receive a good quantity of milk for a certain period of time, which can suppress the tendency towards mutual cross suckling.

## Helpful tips for using the automatic feeder

### a) Feeding amount and -frequency

A high milk intake as of 10 litres per day or more can only be realized, if the calves are fed more than twice a day. Should the calves receive large amounts of milk throughout a small number of meals, it will cause extreme pH-fluctuations in the abomasum<sup>3</sup>, which again will result in stomach ulcer (due to an overly acidic environment (too long under pH 3) and insufficient clotting of the milk (caused by an overly alkaline (too long over pH 5) environment).



### Variation of ph-value in abomasum with different feeding frequencies

<sup>3</sup> A. F. Ahmed et.al, J. Dairy Sci. 85:1502-1508, 2002

<sup>4</sup> Dr. Hans-Jürgen Kunz, Landwirtschaftskammer S.-H., 2016, Fachartikel: „Wie funktioniert die Verdauung!“ [http://www.lksh.de/fileadmin/dokumente/Bauernblatt/PDF\\_Toepper\\_2016/BB\\_36\\_10.09/52-53\\_Kunz.pdf](http://www.lksh.de/fileadmin/dokumente/Bauernblatt/PDF_Toepper_2016/BB_36_10.09/52-53_Kunz.pdf)

Feeding through an automatic feeder is the only alternative to rear the calves as naturally as possible. Six to eight meals per day with a milk intake of 1.5 to 2 litres each have turned out to be ideal.

### b) Milk quality

When feeding calves, it is important to remember that the calf's enzyme system is aligned to digesting the milk of the mother cow. In this early phase, the chymosin enzyme, which is responsible for coagulating the casein in the milk, is most prevalent. 80 % of the distributed enzymes are attributed to this enzyme, which is also called "rennin". This means that in the early phase, calves should only be fed whole milk or milk replacers with a high proportion of skim milk powder. Whey protein is mainly digested by the pepsin enzyme, which in the early phase is only distributed in the abomasum in the amount of 20 %. For this reason, plant proteins cannot yet be digested and absorbed. Therefore, milk replacers made from whey powder in the early phase can lead to reduced performance (growth) or, if plant proteins are intermixed, even to problems with diarrhoea.<sup>4</sup>



The phase of the exclusively milk diet lasts approximately 4 weeks. Only after that period can the calves gradually digest plant proteins because the enzyme spectrum changes. Accordingly, when feeding the calves a milk diet in the early calf rearing period, we have to take two different feeding phases into account:

**Start phase:** In the first four weeks, energy is supplied solely via a milk diet. Highly digestible whole milk or, alternatively, milk replacer containing at least a 30 % proportion of skim milk should be used for the feeding.

The milk concentration should be increased as well, since an ideal digestion only proceeds with a dry matter concentration of 14-15 %. This equals a mixing proportion of 160-175 g per litre of water.

**Weaning phase:** Starting from about the fifth week of life until weaning, when the digestion has to quickly adapt to plant nutrients. During this phase, the calves should be prepared for the increased intake of dry food.

In this process, from approx. day 28 on, the concentration should be lowered to approx. 12 % (135 g/l water) before the milk intake will be reduced as well. This will help the calf's digestive system carefully adapt to the change of diet.

### Always prepared fresh

In this context it is essential that the automatic feeder mixes every meal for each calf individually and fresh, since not only the amount of milk but also the composition might be different. The H&L 100 with its double PowerMixer makes this concept possible.



### c) Hygiene and cleanliness

Milk is easily perishable forage. Under ideal conditions (86-104 °F) a germ population in the milk reduplicates every twenty minutes.

This is why the following aspects should always be taken into account:

#### Storage of fresh milk or milk replacer

Whole milk should always be stored under cool conditions. Once a day the storage tank should be emptied and cleaned. When using the automatic feeder, this can be difficult, since the remaining milk in the tank has to be drained and stored temporarily during cleaning. Furthermore, the feeding will be interrupted. In this case, two milk tanks with an automatic changeover and cleaning



are useful.<sup>5</sup>

Milk replacer should be stored in a dry and cool place (max. 80 °F). At temperatures above 85 °F and under pressure on a pallet the contained fats and oils might leak or exsolve. Needless to say, the best-before date of the milk replacer should be kept in mind as well.

### Cleaning and hygiene of the automatic feeder

As the H&L 100 does not work with a milk depot, the automatic feeder rinses the PowerMixer and all of the milk lines after every feeding with warm water. This ensures that milk residues are removed effectively. Thus the following calf receives a fresh and uncontaminated mixture. In addition, all milk-carrying parts of the H&L 100 are being cleaned with hot water at a temperature of up to 150 °F and detergent twice a day to ensure maximum hygiene in the system.



The outside of the teat is pressure cleaned with fresh water in the HygieneStation after every contact. The germ transmission on the teat is thus reduced significantly. The manual cleaning of the automatic feeder and the HygieneStation should be included into the daily work routine as well. As the machine is splash- and weatherproof, the outer surfaces can safely be washed with water.

### d) The calf's perspective

Too often only the human's perspective on the working process is being looked at. However, with the automatic calf feeding it is essential to consider the calf's point of view as well.



If the calves are supposed to visit the HygieneStation as often as possible in order to drink the desired amount of milk per day, it is important that each visit passes as a positive experience for the animal. The following features of the H&L 100 help to fulfill such experience:

<sup>5</sup> Double Milk Jug from CalfStar, USA, [www.calfstar.com](http://www.calfstar.com)

- **Automatic pump delivers the milk to the teat:** After the milk has been mixed it takes only two seconds to reach the calf. Tedious sucking in over long distances is not necessary.



- **Milk flows directly into the mouth:** As soon as the calf moves the teat, a small amount of milk flows into its mouth. The taste of the milk encourages the animal to continue to suck on the teat. In order to teach the calf, this function can be carried out manually at the HygieneStation as well.



- **Position of the teat:** The teat is positioned so that it slants downwards in a similar way as the teat on the udder and therefore encourages the natural drinking position of the calf. The calf stretches its head and neck, which causes the natural reflex of the esophageal groove. It also does the natural impulsive motions.
- **Lengths of stay on the teat:** After the calf drank its portion of milk, the H&L 100 switches automatically to the other station, if there is another calf waiting for its meal. Meanwhile, the first calf has time to satisfy its sucking reflex on the teat. This procedure reduces cross-sucking in the group.



## Reduced feed costs and improved monitoring with the animal weigh scale

Animal weight is a key indicator of the development of the calf. A healthy calf grows from 500 g to over 1,000 g daily, depending on the feeding routine. Regular weight monitoring provides important information about the health of the calf. For example, if a calf is suffering from diarrhea, the body weight decreases before other symptoms or behavioural changes (reduction of feed intake, etc.) become visible. With daily weight monitoring, these calves could be treated before they become more severely ill.

Another important advantage is the possibility to determine the individually appropriate time to wean a calf from milk drinks. Calves that are already eating more dry feed usually grow faster than other calves. Therefore, the quantity of milk fed to these calves can be reduced sooner, because their digestive system is already well-developed.



Practice has shown that more than 50 % of the calves are weaned based on their weight when a weight-dependent weaning curve is programmed in addition to the alternative age programming. This replaces expensive energy from milk replacers with relatively cheaper energy from concentrate feed and forage feed, which leads to enormous cost savings. Studies have shown savings from \$10 on average per calf in the herd.

### Daily Weight Gain and Feed Costs Compared With Different Weaning Routines

Weaned by	Age	Concentrate Feed	Weight
Daily Weight Gain	690 g	700 g	756 g
Feed Cost	\$118	\$105	\$108
Add'l. Investment	\$0	\$5,600	\$2,200
Expenses per kg of Weight Gain	\$2.23	\$1.90	\$1.90

(Source: State Agriculture and Horticulture Office of Saxony-Anhalt)

- A feeder stall with a weigh scale produces the highest daily weight gain, the lowest cost per kg gained, and pays for itself starting at only about 40 calves a year!



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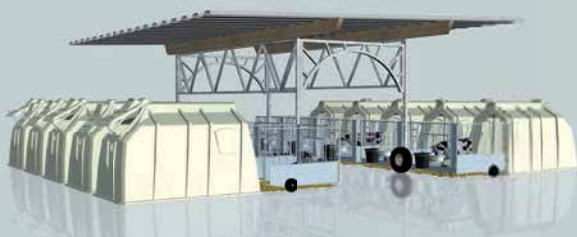
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