



## Frequency and quantity of milk feeding to dairy calves



Picture: Gröbbacher, BOKU

This factsheet is based on Lidfors, Lena, & Hernandez, Carlos E (2023). Mini-review – Frequency and quantity of milk feeding to dairy calves. Zenodo. <https://doi.org/10.5281/zenodo.7794436>



### Biology and needs of calves

In some EU countries it is common to feed milk (or milk replacer) to calves only once a day (OAD) to reduce labour. This practice, however, may restrict behavioural and physiological needs of a calf, in particular if under 3 weeks of age.

Pre-ruminant calves should receive an amount of milk equal to 20 % of their birth weight, provided in at least 2 feedings per day. Ideally, they should be fed from teat buckets because calves are highly motivated to perform sucking behaviour.

The volume of milk (replacer) that can be fed through OAD feeding is unlikely to satisfy a calf's behavioural and nutritional needs, which is why this is considered as a potential welfare concern (see **Thematic factsheet 'Frequency and quantity of milk feeding to calves'** for further details).



### Legal requirements

Council Directive 2008/119/EC of 18 December 2008 lays down the minimum standards for the protection of calves.

'calf' means a bovine animal up to six months old' (Article 2, Paragraph 1.)

'All calves must be provided with an appropriate diet adapted to their age, weight and behavioural and physiological needs, to promote good health and welfare. To this end, their food must contain sufficient iron to ensure an average blood haemoglobin level of at least 4.5 mmol/litre, and a minimum daily ration of fibrous food must be provided for each calf over two weeks old, the

quantity being raised from 50 g to 250 g per day for calves from eight to 20 weeks old. Calves shall not be muzzled.'

(Annex 1, 11.)

'All calves must be fed at least twice a day. Where calves are housed in groups and not fed ad libitum or by an automatic feeding system, each calf must have access to the food at the same time as the others in the group.'

(Annex 1, 12.)




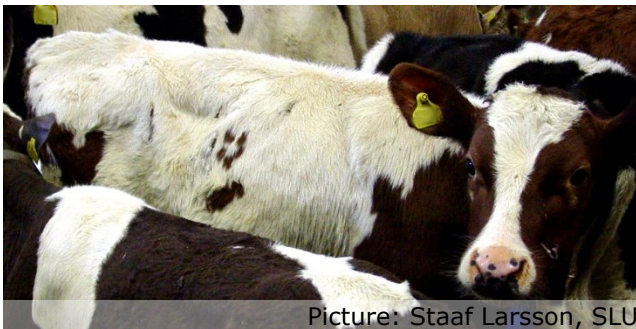
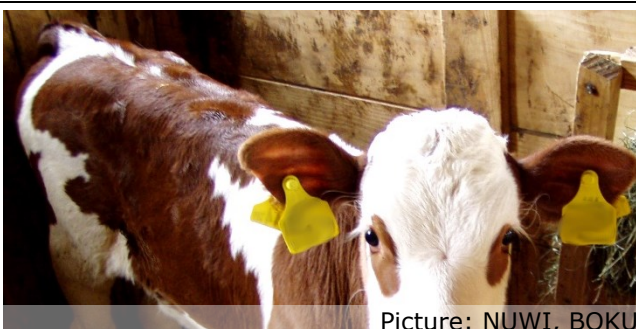
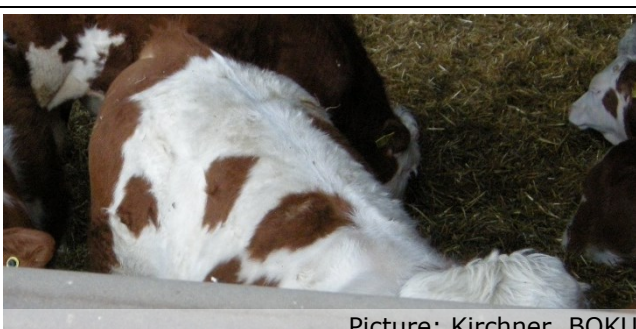
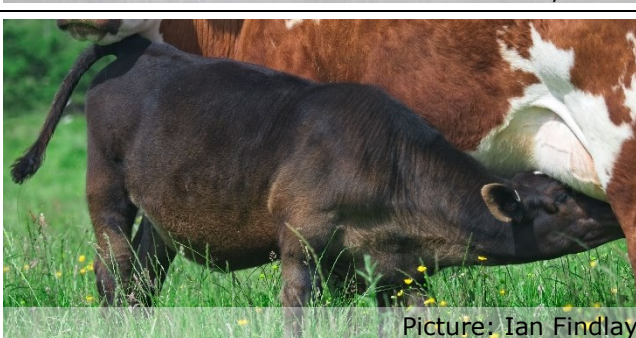
### Method

To evaluate whether calves are provided with an appropriate diet adapted to their age, weight and behavioural and physiological needs information regarding calf feeding routines (frequency, quantity) shall be obtained from the farmer.





As calves under 6 weeks of age are unable to compensate for low milk allowance with increased solid feed intake, it is expected that this will be reflected in a low weight gain. Checking body condition of calves can therefore be considered a proxy to identify feeding routines that compromise animal welfare (grade 2 or below on a 1–5 body condition scale).

Underfeeding can also be visible as a dull and dirty coat and a hunched posture. Behaviours of calves that indicate hunger (cross-sucking, sucking on pen structures, standing/displacing other calves) may be observed at a higher incidence, whereas more satiated calves may be observed to either lie down and rest or exploring and playing. A suggestion of animal-based indicators to assess feeding routines is provided on the following pages.






## Description of body condition scores

Definition of grades of body condition score	Examples
<p>1 – emaciated</p> <p>The ends of the short ribs are sharp to the touch and together give a prominent shelf-like appearance to the loin. The individual vertebrae (spinous processes) of the backbone are prominent. The hook and pin bones are sharply defined. The thurl region and thighs are sunken and in-curving. The anal area has receded and the vulva appears prominent.</p>	 <p>Picture: Staaf Larsson, SLU</p>
<p>2 – thin</p> <p>The ends of the short ribs can be felt but they and the individual vertebrae are less visibly prominent. The short ribs do not form as obvious an overhang or shelf effect. The hook and pin bones are prominent but the depression of the thurl region between them is less severe. The area around the anus is less sunken and the vulva less prominent.</p>	 <p>Picture: Staaf Larsson, SLU</p>
<p>3 – average</p> <p>The short ribs can be felt by applying slight pressure. The overhanging shelflike appearance of these bones is gone. The backbone is a rounded ridge, and hook and pin bones are round and smoothed over. The anal area is filled out but there is no evidence of fat deposit.</p>	 <p>Picture: NUWI, BOKU</p>
<p>4 – heavy condition</p> <p>Individual short ribs can be felt only when firm pressure is applied. Together they are rounded over with no shelf effect. The ridge of the back-bone is flattening over the loin and rump areas and rounded over the chine. The hook bones are smoothed over and the span between the hook bones over the backbone is flat. Area around the pin bones is beginning to show patches of fat deposit.</p>	 <p>Picture: Kirchner, BOKU</p>
<p>5 – fat</p> <p>The bone structure of the topline, hook and pin bones and the short ribs is not visible. Fat deposits around the tailbone and over the ribs are obvious. The thighs curve out, the brisket and flanks are heavy and the chine very round.</p>	 <p>Picture: Ian Findlay</p>






## Description of coat condition

Definition of grades of coat condition	Examples
<p>1 – shiny coat</p> <p>The calf's coat is shiny and lustrous. The coat reflects light brilliantly, resulting in a glossy and vibrant appearance.</p>	 <p>Picture: Brunet, INRAE</p>
<p>2 – almost shiny coat</p> <p>The calf's coat develops a soft shine. The coat reflects light with a gentle radiance, creating a noticeable and nice glow. The shine is less pronounced than in grade 1, but highlights the calf's coat texture and giving it a glossy appearance.</p>	 <p>Picture: Schenkenfelder, BOKU</p>
<p>3 – coat in-between</p> <p>The coat reflects light evenly, creating a subtle and natural glow.</p>	 <p>Picture: Gratzner, BOKU</p>
<p>4 – a bit dull</p> <p>The calf's coat exhibits a faint gleam. The coat reflects light sporadically, resulting in scattered areas of slight shine. However, the overall glow is still minimal and lacks consistency. It may give the impression of a subtle, uneven shimmer across the coat.</p>	 <p>Picture: NUWI, BOKU</p>
<p>5 – dull</p> <p>The calf's coat appears dull and lacklustre. It lacks any noticeable glow or shine, giving it a flat and lifeless appearance. The coat may appear dry or damaged, lacking the natural luster.</p>	 <p>Picture: Schenkenfelder, BOKU</p>





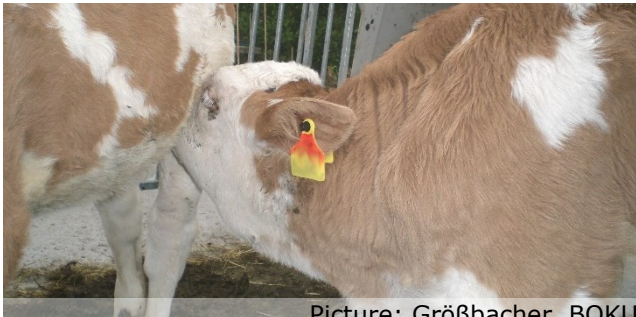
## Description of cleanliness

Definition of grades of cleanliness	Examples
<p>1 – very clean</p> <p>The coat is free from any visible dirt, mud, or faecal matter (0 % soiled).</p>	 <p>Picture: Gratzner, BOKU</p>
<p>2 – clean</p> <p>The coat is free from visible dirt, mud, or large stains. It may have some minor smudges or small areas of dirt (e.g., on tarsal or carpal joints, lower parts of metatarsus) that are not prominent or widespread (1–9 % soiled).</p>	 <p>Picture: Gratzner, BOKU</p>
<p>3 – some dirt</p> <p>The coat shows visible patches of dirt or dust that are not easily missed upon observation. The dirt may be present on various parts of the calf's body, such as the legs, belly, or back, and can range from light smudges to more noticeable accumulations (10–19 % soiled).</p>	 <p>Picture: NUWI, BOKU</p>
<p>4 – dirty</p> <p>20–30 % of the calf's coat is soiled with manure or dirt.</p>	 <p>Picture: Winckler, BOKU</p>
<p>5 – very dirty</p> <p>More than 30 % of the calf's coat is soiled with manure or dirt.</p>	 <p>Picture: Schenkenfelder, BOKU</p>

## Description of body posture when standing

	Definition of grades of body posture when standing	Examples
1 – being active and attentive	The calf is lively and constantly on the move while being attentive to its surrounding.	 <p>Picture: NUWI, BOKU</p>
2 – up-right and moving head	The calf stands with its feet firmly planted on the ground. Its head is in motion and shows attention.	 <p>Picture: Schenkenfelder, BOKU</p>
3 – up-right	The calf remains in an upright position with legs firmly planted on the ground. It shows little signs of activity.	 <p>Picture: Gratzer, BOKU</p>
4 – somewhat hunched	The calf stands with a slightly hunched back (head low or level with body and back slightly arched).	 <p>Picture: Brunet, INRAE</p>
5 – hunched	The calf displays a pronounced hunched back (head low and back arched).	 <p>Picture: NUWI, BOKU</p>

## Description of behaviours indicating hunger

Definition of grades of behaviours indicating hunger	Examples
<p>1 – lying down</p>	<p>The calf is resting in different positions on the ground.</p>  <p>Picture: Rüggeberg, BOKU</p>
<p>2 – exploring pen/ playing</p>	<p>The calf explores the pen by orienting its head towards and 'nosing' objects or pen structures, possibly sniffing or touching them. The calf expresses locomotory play (jumping, running, gambolling) or social play with other calves (head to head, chasing without aggressivity).</p>  <p>Picture: Rüggeberg, BOKU</p>
<p>3 – standing or displacing other calves</p>	<p>The calf stands waiting or displaces other calves (from a feeding nipple that may be present) indicating that it is waiting to be fed.</p>  <p>Picture: Gratzner, BOKU</p>
<p>4 – licking/sucking on pen structures</p>	<p>The calf licks and/or sucks some parts of the pen (e.g., partitions, bars) with similar movements as for cross-sucking.</p>  <p>Picture: Größbacher, BOKU</p>
<p>5 – cross-sucking on other calves</p>	<p>The calf takes a part of another calf's body (ear, navel, scrotum, teat...) into its mouth.</p>  <p>Picture: Größbacher, BOKU</p>

## Recommendation for inspection

The following information regarding herd size and feeding routines shall be obtained from the farmer:

Criterion	
Total number of calves	_____
Number of daily meals provided	_____
Milk (replacer)	_____ times per day
Concentrates	_____ times per day
Roughage	_____ times per day
Age at which solid feed is introduced	_____ weeks
Quantity of milk (replacer) fed	
per meal	_____ L $\triangleq$ _____ % of birth weight
per day	_____ L $\triangleq$ _____ % of birth weight

Assessment of herd-level prevalence of the following animal-based measures helps to inform whether calves are fed milk adequately:

Animal-based measure	Grade 1			Grade 2			Grade 3			Grade 4			Grade 5		
	# <sup>1</sup>	P <sup>2</sup>	T <sub>r</sub> <sup>3</sup>	#	P	T <sub>r</sub>	#	P	T <sub>r</sub>	#	P	T <sub>r</sub>	#	P	T <sub>r</sub>
Body condition			0			<30			>60			<10			0
Animal-based measure	Grades 1 and 2			Grade 3			Grade 4			Grade 5					
	#	P	T <sub>r</sub>	#	P	T <sub>r</sub>	#	P	T <sub>r</sub>	#	P	T <sub>r</sub>			
Coat condition						>80			<15			<5			0
Cleanliness						>80			<15			<5			0
Body posture when standing						>80			<20			0			0
Behaviours indicating hunger						>80			<15			<5			0

<sup>1</sup>Number of calves in respective grading.

<sup>2</sup>Herd-level prevalence calculated as  $P[\%] = \frac{\# [\text{Number of calves in respective grading}]}{\text{Total number of calves}} \times 100$ .

<sup>3</sup>Recommended threshold T<sub>r</sub> expressed as herd-level prevalence in %.