# New concept to ensure the smooth growth of heifers

How the heifer is managed has a major impact on the future dairy cow's longevity and is a gauge of performance and economic return. Special care is thus essential and everything must be taken into consideration, from the earliest moments of the animal's life.

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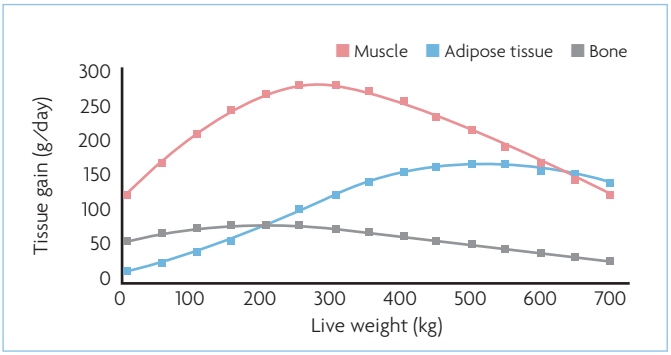
A precocious breed, the Holstein heifer, by 24 months, should reach 90-95% of its adult weight during calving in order to reduce the risk of birth complications and to optimise first lactation milk yield. The growth rate and live weight objectives must be reached to ensure that the dairy herd is restocked.

## Growth rate adapted throughout development

Over the first 12 months, the gain varies between the different tissues (Fig. 1). First, the nerve, bone and muscle tissues grow rapidly. Careful management is thus crucial to achieve optimum development of the heifer and longevity of the dairy cow. To support these needs, the growth rate objective is increased to 900g/day to reach 200kg at six months. Adipose tissues then form at six months to reach a growth rate that is sustained from 12 months. Energy intake should be closely monitored from year one to avoid fattening. The desired growth rate is therefore lower than in the first phase, at 750g/day to reach 400kg at 15 months.

At the final level, the objective is 600kg at 24 months. Physical development is the primary criterion to be monitored as it is more strongly correlated with the onset of puberty than age alone.

**Fig. 1. Evolution of the gain in the main components in growing cattle (Robelin 1986).**




## Transitioning from milk to a solid diet to support growth

Milk, whether reconstituted or whole, provides the essential nutrients required for the calf's development over a short period.

From the second week, it is recommended to introduce a starter. Over the first six months, the calf goes from being a preruminant to a ruminant with an anatomically and physiologically functioning rumen at around the age of three months.

Consumption of solid feed (concentrates and fodder) promotes the anatomical and functional development of the digestive tract, particularly the rumen, and builds up the digestive microbiota.

Within three weeks of life, the rumen is colonised, followed by the proliferation of prokaryotes, eukaryotes and the epimural flora.

Optimum cellulolytic flora in the calf is strongly linked to the period of contact with its mother. In addition to transmission through the mother's saliva, the concentrates help to diversify bacterial populations in the calf's rumen while also serving as a nutritional base (production of volatile fatty acids) and bacterial transmission vector.

At three weeks, the calf's intake capacity is 120g DM. This gradually increases while milk consumption decreases. Aside from live weight, a minimum consumption of 2kg DM/day is the determining factor in deciding when to wean.

Puberty occurs when the heifer reaches 40-50% of its adult weight. Generally speaking, Holstein heifers reach puberty at around the age of 9-10 months.

In addition to the effect of the breed, puberty is achieved even younger with early weaning and with a diet rich in concentrates (Fig. 2). However, an average daily gain above 900g/day at the prepubescent stage actually delays puberty.

Growth rate and early intake of solid feed play an important role in the development of the young ruminant.

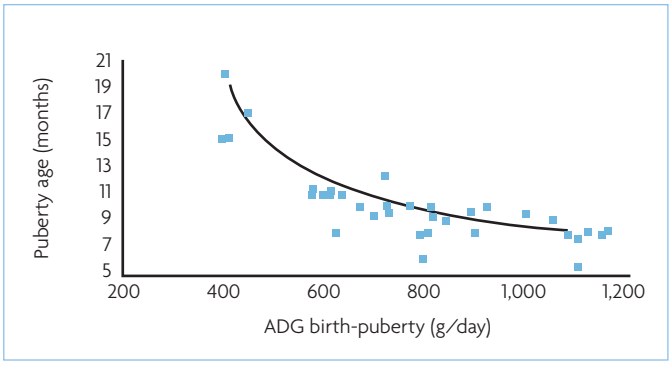



**Fig. 2. Impact of the growth level, from birth to puberty, on the onset of first oestrus (Troccon and Petit 1989).**

## The consequences of poor weaning

Poorly executed weaning has serious physiological consequences for the future dairy cow. First, the calf may suffer from a potential digestive problem in which its oesophageal groove reflex function becomes impaired. Stress, such as that experienced during a long transport or a change in the feeding plan, can result in an imperfect groove closure which allows an increased quantity of milk to enter the rumen. The milk is then fermented by the under-developed rumen.

Subsequently, motor ability is diminished, and ruminal acidosis may cause an ulcer to form in the case of severe erosion of the lining. The calf is thus condemned.

Second, a low intake of solid feed before weaning slows growth and creates an energy deficit which becomes even greater once milk consumption is stopped.

It is therefore essential that the calf learns to consume concentrates as soon as possible to avoid digestive problems and feelings of extreme hunger until the digestive tract adapts and is able to digest the new feed correctly once it becomes the calf's only food source after weaning.

Delayed growth around the time the calf is weaned cannot be offset later. The consequence for the future dairy cow is delayed breeding due to poor bone development, which may lead to complications during calving (narrower pelvis), and to reduced production in first lactation (-452kg to -1402kg), partly as a result of limited mammary development.

Managing production by adjusting parameters in response to each need works well for machines but not so well for living, sensitive creatures.

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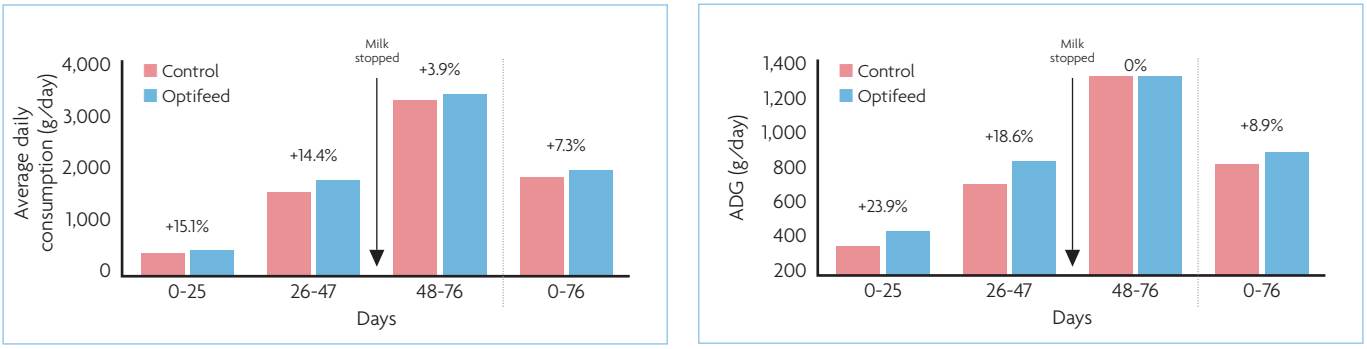


**Fig. 3. Effects of Optifeed Ruminant incorporated into the starter for Holstein heifers weaned at seven weeks.**

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Seeing the animal as a collection of juxtaposed physiological units is extremely limiting for both the animal and its productivity.

Phodé places the animal at the centre of its holistic approach. The animal is constantly interacting with its environment through the intermediary of its senses, which play a vital role. Backed by 20 years of expertise in aromatic molecules and their impact on the brain, as well as by an understanding of the animal and of the issues facing farmers, Phodé's research has successfully combined selected plant extracts and specific sensory molecules to contribute to the 'Better-Being' of production animals.

## Two holistic approaches

To ensure the attractiveness of the food, positive memorisation and appetite stimulation in the unweaned calf, Phodé has developed a complex of attractant active ingredients specially designed for ruminants.

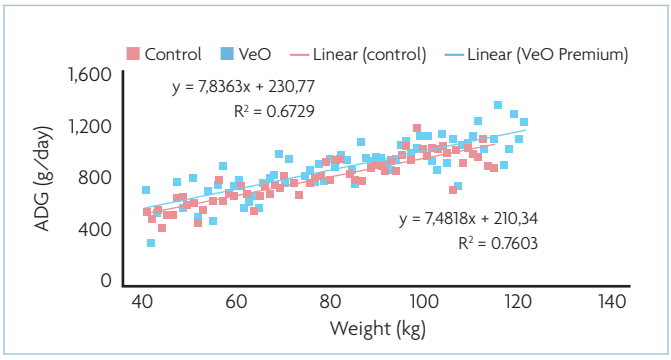
Modelling behavioural response to olfactory stimuli was conducted by Phodé's scientific experts in order to determine the attractive raw materials to be used as well as their optimal concentrations.

An example of this application was provided on an experimental dairy farm in Spain. Concentrate consumption and growth were measured in two groups (control and Optifeed Ruminant) of 24 Holstein heifers before and after weaning at around the age of seven weeks (Fig. 3).

Based on olfactory stimulation, this provides a positive, sensory solution to promote starter intake.

A second potential strategy for stimulating growth is to reduce the perception of chronic stresses (changes in the feed schedule, individual pen/grouping, treatments, etc) that often arise in the first weeks of life. These stresses alter feeding behaviour (food neophobia, reduced appetite), development (catabolism of body reserves), and sex hormone secretion.

**Fig. 4. Effect of VeO on the growth of replacement dairy heifers.**




VeO is a complex product made primarily from a natural extract of the Rutaceae family. Its unique mode of action involves the transmission of active ingredients from the sensory organs to the brain, where it modulates the stress nerve signal in identified cerebral areas known for their role in triggering hormonal and physiological reactions to stress.

One application of this solution was implemented on a commercial farm in Colombia which specialises in raising Holstein replacement heifers.

The results demonstrate a 40kg to 120kg ADG, 11.4% higher in the group receiving VeO (892g/day versus 801g/day) (Fig. 4).

In this example, the management of psychosocial stresses helps respond to the growth challenge experienced in the animal's first weeks of life. These two different approaches based on functional olfaction offer a solution to problems related to the starter phase in young dairy heifers. ■

References are available from the author on request