

Supporting calves with phytogenics for higher performance

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Calf management is a major aspect of dairy operations. Under intensive calf management, short rearing periods with high daily weight gains are desirable goals from an economic point of view. Farmers and farm managers are becoming more aware of the advantages of intensified feeding systems that lead to better ruminal development accompanied by higher growth rates and subsequently higher milk performances in first lactations.

Intensified growth programs, based on higher milk or milk replacer intakes in combination with continuous weaning, encourages starter intake in the pre-weaning period and demands accelerated early nutrition. Thus, animals are supported to achieve the growth of their genetic potential.

Challenges in rearing calves

Overall, high weight gains require a good health status in pre-weaning calves. Morbidity and mortality of calves in the rearing period represent major financial losses for farmers. These parameters are

connected to direct costs due to calf losses, treatments and negative long term effects on performance.

Feed changes occurring during the first three months of life are major stress events affecting intestinal health and performance.

Consequently, it has become a common practice to apply antibiotic growth promoters (AGPs) at sub-therapeutic levels in milk replacers and starter formulations. It is estimated that the exclusion of AGPs from ruminant feed increases production costs by up to 5%.

Antibiotic resistance in animal production and the risk of antibiotic residues in products of animal origin and in the environment have raised concerns among the public and scientific community. Government regulations are increasingly aimed at restricting the use of antibiotics as growth promoters or banning the use of AGPs, as in the European Union in 2006.

Health triggers

The exposure to various infectious agents through feed may be accompanied by various other stressors originating from the environment or suboptimal management. These consequently have a negative impact on the calf's well being and health.

Calfhood diseases may affect the

	Control group	PFA group
Diarrhoea score*	1.25 ^b	1.22 ^a
Diarrhoea days	4.53 ^b	3.03 ^a

^{a,b} Means with different superscripts differ significantly ($p < 0.01$) *Scour score: 1 = normal, 2 = loose, 3 = water separation, 4 = watery with dehydration.

Table 1. Decreased diarrhoea score and number of diarrhoea days in neonatal calves offered CMR with and without PFAs.

economic viability of dairy operations with losses arising from respiratory and gastrointestinal tract diseases. The latter leads to diarrhoea caused by bacterial infection in the intestine.

According to the National Animal Health Monitoring System (NAHMS) report 2010, 23.9% and 12.4% of pre-weaned heifer calves suffer from diarrhoea or other digestive problems and respiratory tract diseases, respectively. More than 75% of these disease incidences were treated with antibiotics.

Control of scours is a costly endeavour as diarrhoea causes greater financial loss to dairy operations than any other disease.

All in all, securing high animal performance raises the demand for additives that can substitute for or even exceed the positive effects of AGPs on feed efficiency and disease prevention without further arousing public concerns.

Several alternatives may be applied to improve health. Among the alter-

natives are phytogenics which represent a group of plant-derived products, including a variety of promising substances that enable calves to maximise calf growth according to their full genetic potential while improving overall health.

A natural solution

An increasing number of scientific literature have demonstrated the efficacy of phytogenic substances on growth and feed efficiency in various animal species. Phytogenics, also referred to as botanicals or phytochemicals, have been used for medicinal purposes in humans and animals for centuries. Phytogenics contain secondary plant metabolites with diverse positive influences on the health of animals.

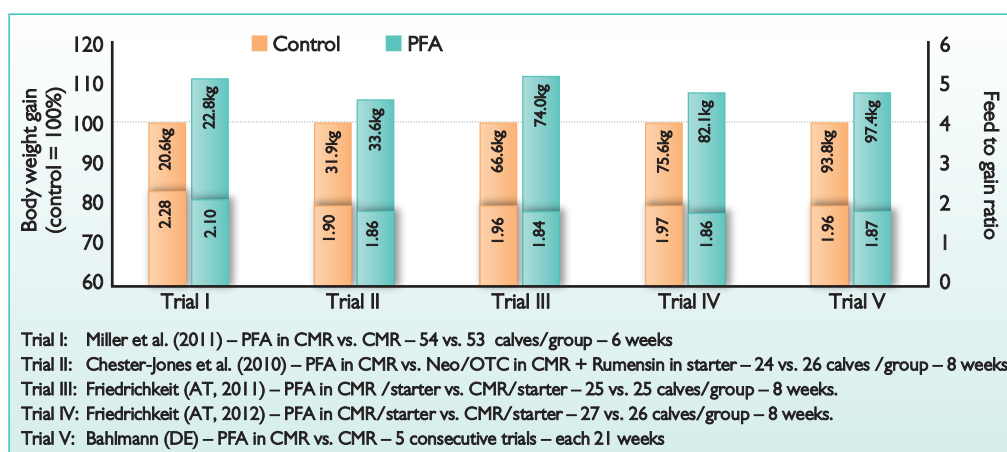
Besides sensory effects influencing palatability, phytogenic feed additives (PFAs) stimulate the production of saliva and gastric juices and exert great anti-inflammatory, antimicrobial as well as anti-oxidative activities. The positive influence of PFAs on zootechnical parameters particularly of broilers and pigs has been cited in a growing number of literature. With regard to calves, published scientific research data is still limited.

Improving feed efficiency

The efficacy of phytogenics for calves on performance and feed efficiency is shown by the example of a defined PFA based on herbs, spices and essential oils (Digestarom; Fig. 1). Growth performance and feed efficiency of calves receiving PFAs in calf milk replacer (CMR) and/or PFAs in starter feed of calves were

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Fig. 1. Increased performance and feed efficiency in calves with supplementation of PFAs containing herbs, spices, essential oils and non-volatile compounds.



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compared to those of calves fed either non-medicated CMR and calf starter or medicated CMR (neomycin and oxytetracycline) and medicated calf starter (Rumensin). Overall, body weight gain was higher by 8%. Feed efficiency was improved by 5% on average across the five trials, so that calves receiving PFAs required only 1.91 kg of feed per kg body weight gain compared to 2.01 kg of feed for the control groups.

Decreased challenge

Maintaining healthy calves is essential for calf development and growth. Good health status is a key requirement for high weight gain. In particular, intestinal disturbances along with an increased number of diarrhoea incidences play a key role in impacting animals' health negatively.

Miller et al. (2012) reported significantly increased performance and feed efficiency with the application of a PFA in the CMR (Digestarom Milk) in a trial conducted at an experimental farm in the United States. The experiment also exhibited significant improvements in diarrhoea scores and significant reductions in diarrhoea days in neonatal calves when applying the PFA (Table 1).

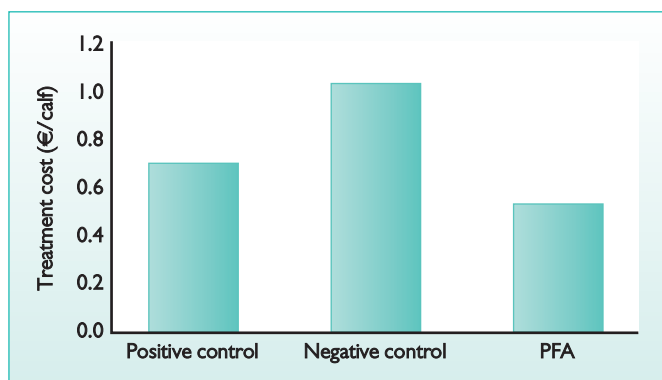


Fig. 2. Decreased medical treatment costs in neonatal calves offered a CMR with PFAs compared to no supplementation (negative control) and addition of AGPs (positive control).

Another experiment conducted at the Calf and Heifer Research Facility at the University of Minnesota yielded interesting findings with regard to veterinary treatment costs. In this study growth performance and medical treatment costs in neonatal calves receiving CMR supplemented with a PFA (Digestarom P.E.P. sol), AGPs or no supplementation at all were recorded.

Results showed that medical costs were lowest for calves of the PFA group compared to calves of the positive (neomycin and OTC, Rumensin) and negative control (Fig. 2). The PFA group also exhibited higher weight gains and an improved

overall health status along with lower disease incidence. Differences in treatment costs were remarkable. The expenses due to medical treatments were slightly above €1.00 per calf in the negative control group.

Treatment costs were reduced to €0.70 in calves receiving AGPs and were further lowered with PFA supplementation (€0.57/calf).

Efficacy of PFAs

These experimental findings confirm the potential of PFAs as powerful tools that stabilise the digestive system due to their anti-inflammatory,

antioxidative and antimicrobial efficacies. Various compounds of plant origin are known to positively affect radical scavenging abilities and down-regulate inflammatory mediators, reducing immune stress.

Conclusion

Adequate growth rates and excellent ruminal development are the basis for raising healthy calves that eventually mature into high performing cattle. However, calftooth diseases, mainly arising from bacterial challenges in the intestinal tract, greatly impact the economic viability of dairy farms due to significant medication costs. As a result, AGP supplementation is still a common practice in many countries.

Amid rising concerns over the use of antibiotics in animal production, phytogenics are gaining substantial interest. Positive experimental findings on growth performance, feed efficiency and health status have shown that supplementation with mixtures of herbs, spices, essential oils and plant extracts (Digestarom) reduces the need for AGPs.

The results obtained are excellent indicators of the potential of phyto-

References are available from the author upon request