The big challenge: Keeping sows healthy and productive – Part 1 General aspects to be observed

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Sow mortality critically impacts herd performance and efficiency in modern pig production. Keeping the sows healthy is, therefore, the best strategy to keep them alive and productive and the farm's profitability high.

Rising mortality rates are alarming

In recent years, sow mortality has increased across pig-raising regions in many countries. Eckberg's (2022) findings from the MetaFarms Ag Platform (including farms across the United States, Canada, Australia, and the Philippines) determined an increase of 66.2% between 2012 and 2021.

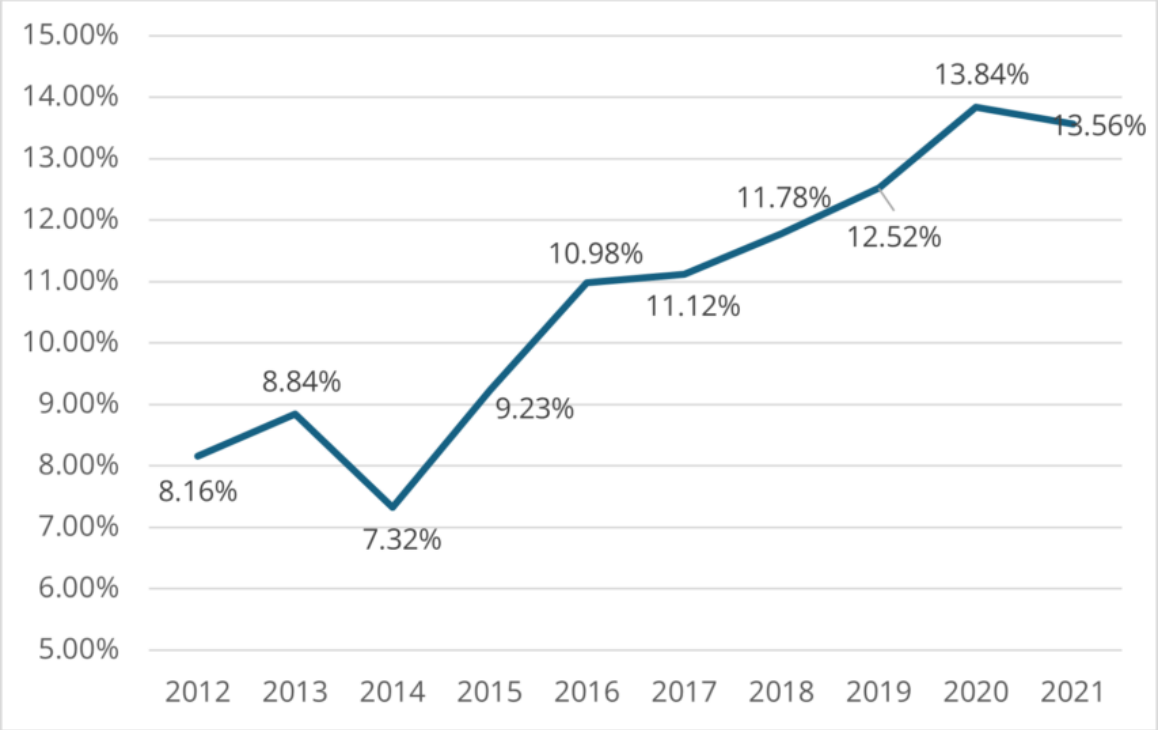

Figure 1: Sow mortality rates from 2012 to 2021 (Eckberg, 2022)

What can be done to decrease mortality rates?

Several measures can be taken to reach a particular stock of healthy and high-performing sows. In the following, the main remedial actions will be explained.

1. Determination of the cause of death

If a sow is dead, it must first be clarified why it has died. If the sow is culled, the reason for this decision is usually apparent. If the sow suddenly dies, investigations, including a thorough postmortem, are extremely valuable to determine the cause of death. Kikuti et al. (2022) provided a collection of the most-occurring causes of death in the years 2009 to 2018. As often, no necropsy is conducted, and the causes of death remain unclear, as shown by the high numbers of “other”. Locomotory (e.g., lameness) and reproductive (e.g., prolapse, endotoxemic shock from retained fetuses) incidents account for approximately half of the recorded sow mortalities (Kikuti et al., 2022), especially during the first three parities. (Marco, 2024).

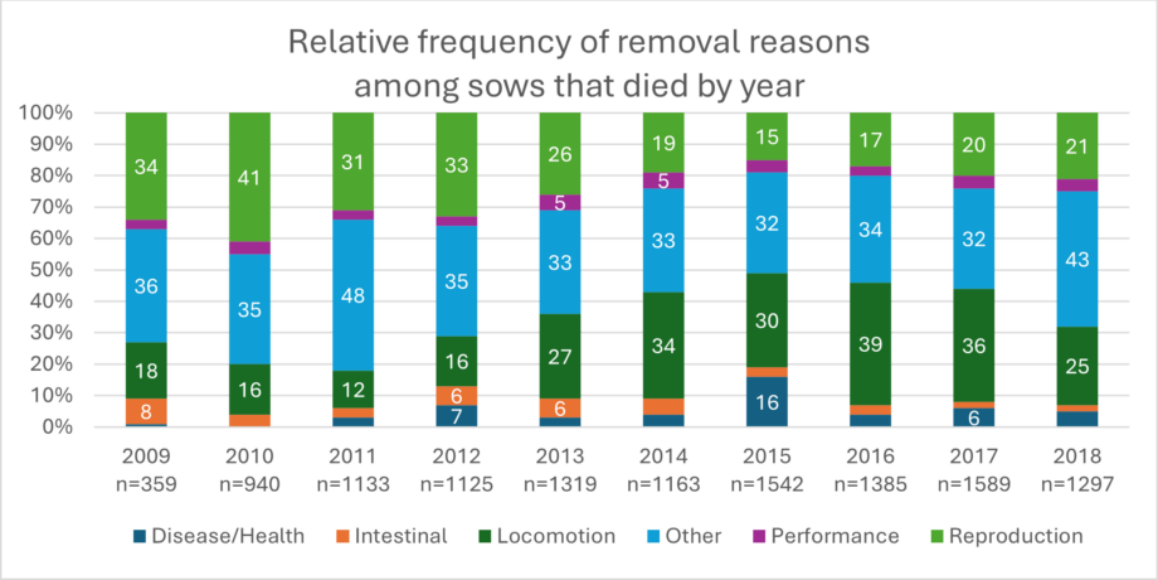

Figure 2: Removal reasons and their frequency from 2009 to 2018 (Kikuti et al., 2022)

Evaluating detailed breeding history together with the cause of death will provide perspective and assist veterinary, nutritionist, and husbandry teams with interventions to prevent similar events and early sow mortality.

Selection of the gilts

After selecting the best genetics and rearing the gilts under the best conditions, further selection must focus on physical traits such as structure, weight, height, leg, and hoof integrity.

Additionally, as we have more and more group housing for sows, the **selection for stress resilience** can positively impact piglet performance (Luttmann and Ernst, 2024). The following table compares stress-resilient and stress-vulnerable sows concerning piglet performance and shows the piglets of the vulnerable sows with worse performance.

Table 1: Influence of stress resilience on performance (Luttmann and Ernst, 2024)

Trait	SR	SV	p-Value
Birth weight (kg)	1.350 ± 0.039	1.246 ± 0.041	0.083
Wean weight(kg)	6.299 ± 0.185	5.639 ± 0.202	0.033*
Suckling ADG (kg/d)	0.191 ± 0.005	0.165 ± 0.005	0.004**

Least square means and standard error of stress resilient (SR) and stress vulnerable (SV) for each trait; significance threshold of $p<0.05$ with * indicating $0.01<p<0.05$, ** indicating $0.001<p<0.01$

How to manage the gilts best

The management of the gilts must consider the following:

1. Age at first estrus should be <195 days:
   Gilts having their first estrus earlier show higher daily gain and usually higher lifetime productivity. In a study conducted by Roongsitthichai et al. (2013), sows culled at parity 0 or 1 exhibited first estrus at 204.4±0.7 days of age, while those culled at parity ≥5 exhibited first estrus at 198.9±2.1 days of age (P=0.015).
2. Age at first breeding should lay between 200 and 225 days:
   If the sows are bred at a higher age, they have the risk of being overweight, leading to smaller second-parity litters, longer wean-to-service intervals, and shorter production life.
3. The body weight at first mating should be between 135 and 160 kg:
   To reach this target within 200-225 days, the gilts must have 600-800 g of average daily gain.

Breeding underweight gilts reduces first-litter size and lactation performance. Overweight gilts (>160 kg) face higher maintenance costs and locomotion issues.

4. The number of estruses at first mating should be 2 or 3:
   Accurately track estrus and breed on the second estrus. Research shows that delaying breeding to the second estrus positively affects litter size. Only delay breeding to the third estrus to meet minimum weight targets.

Housing

Gestating sows are more and more held in groups. Understanding the process of group housing is essential for success. The following graphic shows factors impacting successful grouping.

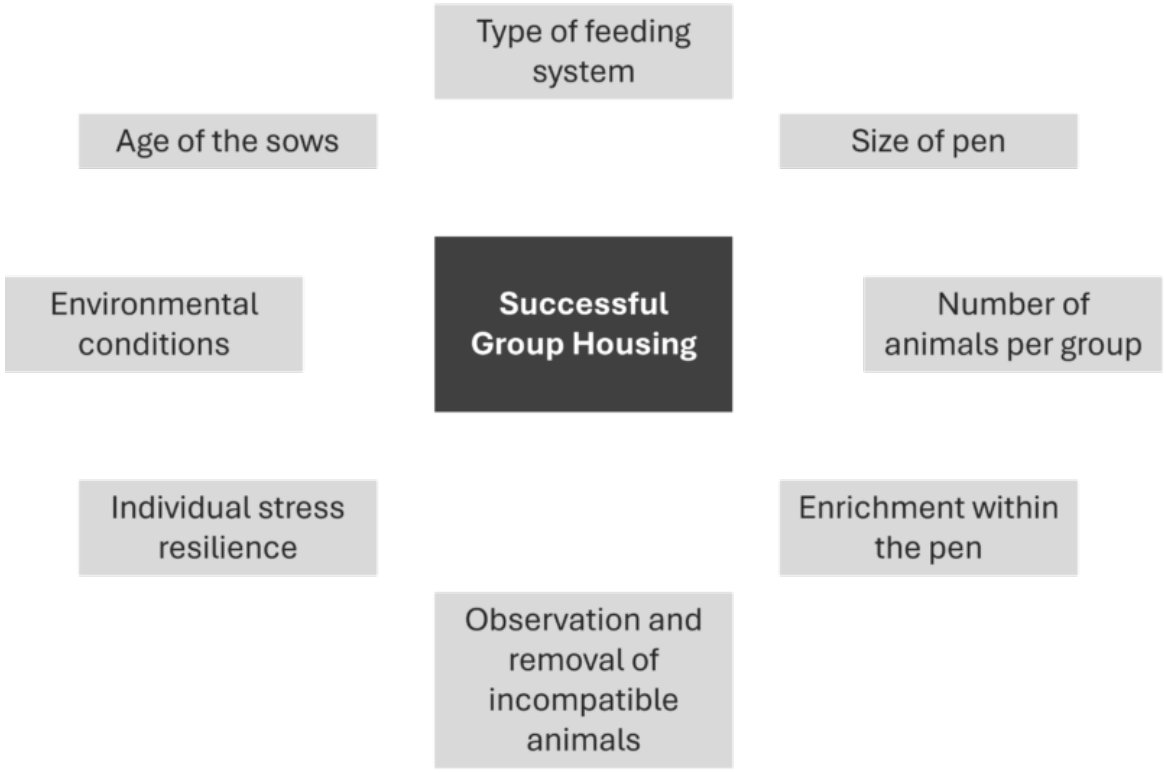

Figure 3: Factors influencing group housing

If the groups are not well-established yet, the stress levels among sows are higher, leading to

- More leg injuries due to aggressive behavior or fighting for resources
- Higher rates of abortions and returns to service
- Reduced sow performance, including decreased productivity, lower milk yield, and poor piglet growth due to compromised immune function and overall health

To mitigate stress in group housing, it is crucial to implement proper group management practices, which

include gradual introductions, maintaining stable social structures, and ensuring adequate space and resources. This helps promote a calmer environment, improving animal welfare and herd performance.

Responsible on-farm pig care

Caregivers must be well-trained and equipped to provide high-quality care. Insufficient or unskilled pig caregivers can significantly affect the growth and development of prospective replacement gilts, ultimately influencing their suitability for the breeding herd:

- **Growth Rates**: Suboptimal nutrition and health management result in slower growth rates and poor body condition.
- **Health Issues**: Unskilled handling may increase the risk of disease transmission, injuries, and stress, all of which can adversely affect growth and overall development.
- **Behavioral Problems**: Poorly managed environments can increase aggression and competition among animals, hindering growth and health.
- **Selection Criteria**: Ineffective growth and health monitoring can result in misjudging the potential of gilts, leading to the selection of less suitable candidates for the breeding herd.

Table 2: Influence of handling on growth performance and corticosteroid concentration of female grower pigs from 7-13 weeks of age (Hemsworth et al., 1987)

	Unpleasant	Pleasant	Inconsistent	Minimal
ADG (g)	404^{a}	455^{b}	420^{ab}	4.58^{b}
FCR (F:G)	2.62^{b}	2.46^{a}	2.56^{b}	2.42^{a}
Corticosteroid conc (ng/mL)	2.5a	1.6b	2.6a	1.7b

Responsible on-farm pig care is crucial to keep sows healthy and performing. Poor sow observations (e.g., failure to identify stressed, anorexic, or heat-stressed sows) or inappropriate farrowing interventions can directly influence sow health and potentially reduce subsequent performance or mortality. On the contrary, rapid and proactive identification of sows needing intervention can save many animals that would otherwise die or need to be culled.

Keeping sows healthy and performing is manageable

The maintenance of sows' health is a challenge but manageable. Observing all the points mentioned, from selecting the right genetics over rearing the piglets under the best conditions to managing the young gilts, can help prevent disease and performance drops. For all these tasks, farmers and farm workers who do their jobs responsibly and passionately are needed. The following article will show nutritional interventions supporting the sow's gut and overall health.

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Nutritional strategies to maximize the health and productivity of sows

Conference Report

During lactation, the focus should be on maximizing milk production to promote litter growth while reducing weight loss of the sow, stated Dr. Jan Fledderus during the recent EW Nutrition Swine Academies in Ho Chi Minh City and Bangkok. A high body weight loss during lactation negatively affects the sow’s

performance in the next cycle and impairs her longevity.

Milk production – ‘push’ or ‘pull’?

“Is a sow’s milk production driven by “push” – the sow is primarily responsible for milk production, or “pull” – suckling stimulates the sow to produce milk?” asked Dr. Jan Fledderus at the beginning of his presentation. The answer is that it is primarily a pull mechanism: piglets that suckle effectively and frequently can activate all compartments of the udder, leading to increased milk production. Therefore, the focus should be optimizing piglet suckling behavior (pull) to enhance milk production. This highlights the importance of piglet vitality and access to the udder in maximizing milk yield.”

Modern sows are lean

Modern sows have been genetically selected for increased growth rates and leanness, which alters their body composition. This makes traditional body condition scoring (BCS) methods, which rely on subjective visual assessment and palpation of backfat thickness, less effective. This may not accurately represent a sow’s true condition, especially in leaner breeds where muscle mass is more prominent than fat. Technology, such as ultrasound measurements of backfat and loin muscle depth, provide more accurate assessments of body condition and can help quantify metabolic reserves more effectively than visual scoring.

Due to their increased lean body mass, we must consider adjusted requirements for amino acids, energy, digestible phosphorus, and calcium. Their dietary crude protein and amino acid requirements have increased drastically.

Importance of high feed intake for milk production

Sows typically catabolize body fat and protein to meet the demands of milk production. Adequate feed intake helps reduce this catabolism, allowing sows to maintain body condition while supporting their piglets’ nutritional needs.

Feeding about 2.5kg on the day of farrowing ensures that sows receive adequate energy to support the farrowing process and subsequent milk production. Sows that are well-fed before farrowing tend to have shorter farrowing durations due to better energy availability during labor.

A short interval between the last feed and the onset of farrowing (□3 hours) has been shown to significantly reduce the probability of both assisted farrowing and stillbirths without increasing the risk of constipation. To enhance total feed intake, feeding lactating sows at least three times a day is helpful.

Dr. Fledderus recommended a gradual increase in feed intake during lactation, then from day 12 of lactation to weaning, feeding 1% of sow’s bodyweight at farrowing + 0.5 kg/piglet. For example, for a 220kg sow with 12 piglets:

(220 kg x 0.01) + (12 x 0.5 kg) = 2.2 +6 = 8.2 kg total daily feed intake

Energy source – starch versus fat

The choice between starch and fat as an energy source in sow diets has substantial implications for body composition and milk production.

Starch digestion leads to glucose release, stimulating insulin secretion from the pancreas. Insulin is

essential for glucose uptake and utilization by tissues. Enhanced insulin response can help manage body weight loss by promoting nutrient storage and reducing the mobilization of the sow's body reserves.

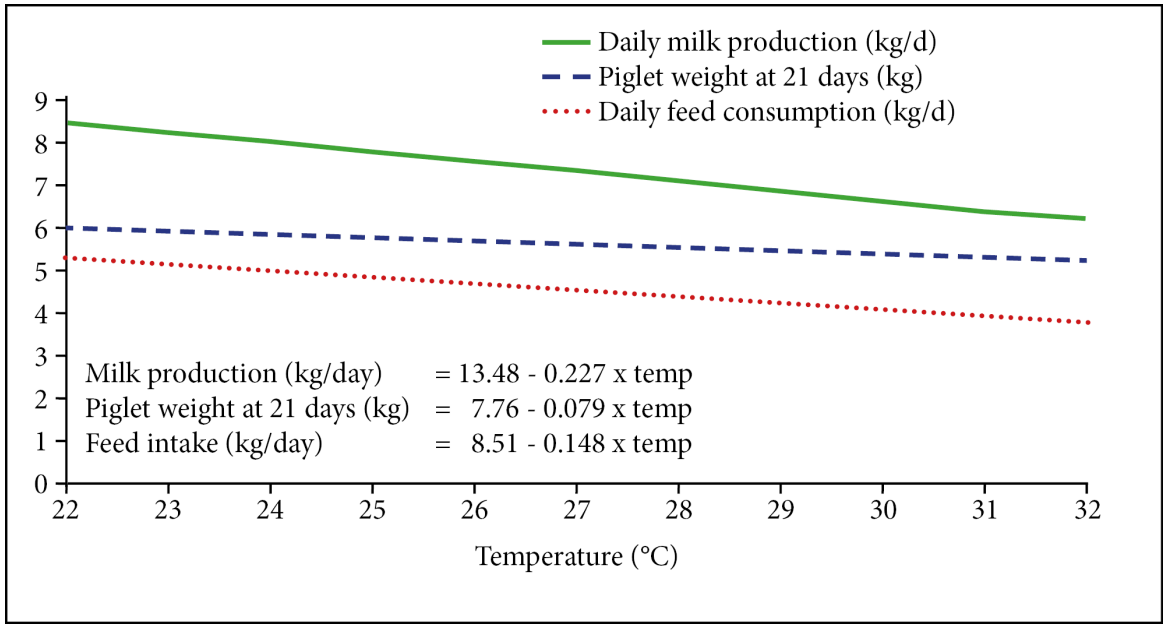
Sows fed diets with a higher fat supplementation had an increased milk fat, which is crucial for the growth and development of piglets.

Table 1: Effect of energy source (starch vs. fat) on sows' body composition and milk yield (Schothorst Feed Research)

	Diet 1	Diet 2	Diet 3
Energy value (kcal/kg)	2,290	2,290	2,290
Starch (g/kg)	300	340	380
Fat (g/kg)	80	68	55
Feed intake (kg/day)	6.7	6.7	6.8
Weight loss (kg)	15	11	10
Weight loss (kg)	3.1	2.7	2.3
Milk fat (%)	7.5	7.2	7.0
Milk fat (%)	260	280	270

Heat stress impacts performance

The optimum temperature for lactating sows is 18°C. A meta-analysis concluded that each 1°C above the thermal comfort range (from 15° to 25°C) leads to a decrease in sows' feed intake and milk production and weaning weight of piglets, as shown below.



Effect of heat stress on lactating sows (according to Ribeiro et. al., 2018 Based on 2,222 lactating sows, the duration of lactation was corrected to 21 days)

To mitigate the effects of heat stress, which reduces feed intake, it is beneficial to schedule feeding during cooler times of the day. This strategy helps maintain appetite and ensures that sows consume sufficient nutrients for milk production. Continuous access to cool, clean water can also enhance feed consumption.

Pigs produce much heat, which must be "excreted". Increased respiratory rate (>50 breaths/minute) has been shown to be an efficient parameter for evaluating the intensity of heat stress in lactating sows.

When sows resort to panting as a mechanism to dissipate heat, this rapid breathing increases the loss of

carbon dioxide, resulting in respiratory alkalosis. To prevent a rise in blood pH level, HCO_3 is excreted via urine, and positively charged minerals (calcium, phosphorous, magnesium, and potassium) are needed to facilitate this excretion. However, these minerals are crucial for various physiological functions. As their loss can lead to deficiencies that affect overall health and productivity, this mineral loss must be compensated for.

Implications for management

Implementing effective nutritional strategies together with robust management practices is crucial for maximizing the health and productivity of sows. The priority is to stimulate the sow to eat more. This not only enhances milk production and litter growth but also supports the overall well-being of the sow. Regularly assessing sow performance metrics – such as body condition score, feed intake, and litter growth – can help identify areas for improvement in nutritional management.

EW Nutrition's Swine Academy took place in Ho Chi Minh City and Bangkok in October 2024. Dr. Jan Fledderus, Product Manager and Consultant at the S&C team at Schothorst Feed Research, with a strong focus on continuously improving the price/quality ratio of the diets for a competitive pig sector and one of the founders of the Advanced Feed Package, was a reputable guest speaker in these events.

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4 steps to improve dairy cow fertility through feeding

*By **Judith Schmidt**, Product Manager On Farm Solutions*

The average pregnancy rate for dairy cows has declined over the past decades. But why is my cow not getting pregnant? Is it because of feeding? These are questions we ask ourselves

when things do not quite work out with the offspring in the cowshed. Economic success in the cow barn is closely related to the successful reproduction of our cattle herd.

The maintenance and possible improvement of fertility are becoming increasingly important issues for farm productivity. Infertility is still one of the main reasons for culling on dairy farms. When farmers decide to cull a cow after a few unsuccessful inseminations, they often ask themselves whether this could not have been prevented. There is no “all-encompassing” solution for achieving an optimal fertility rate, which ultimately requires excellent management. Relevant factors include oestrus monitoring and insemination timing, genetic conditions, feeding, hygiene, and climate.

How can I tell if a cow is in heat?

A cow behaves differently than usual during oestrus. She is restless and walks around more. A cow in heat stands next to other cows – head to tail. Sie also quarrels with her herd mates or sniffs at the shame of the other cows. Fertility in cows decreases during late winter and spring; the resulting absence of clear signs of oestrus makes it difficult to recognize the right time for insemination. There are several possible causes which will be reviewed below.

Possible causes of fertility problems in dairy cows

Beta-carotene deficiency

A productive herd needs to receive an optimal mineral and trace element supply. Beta-carotene, in particular, is essential for herd fertility. But why?

Beta-carotene is an orange-yellow plant pigment whose name comes from “carrot” because of its appearance. It is also a precursor of vitamin A. Both as a precursor and as vitamin A itself, it is essential for the organism of humans and animals, particularly when it comes to the fertility of dairy cows. Besides its important function as provitamin A, beta-carotene also exerts an independent effect on the ovary. It influences the quality of the follicle and the corpus luteum. Beta-carotene also protects the corpus luteum. It promotes the synthesis of the pregnancy hormone progesterone and thus enables the fertilized egg to implant successfully in the uterine lining.

A beta-carotene deficiency can lead to the following problems:

- Smaller, not fully functional follicles
- Altered oestrus intervals
- Indistinct signs of oestrus
- Decreased corpus luteum quality

Scientific trials show how much a beta-carotene deficiency influences the fertility process. With a beta-carotene deficiency, the fertilization rate after the first insemination is only 40%, whereas with a normal beta-carotene supply, the fertilization rate is about 70%.

How do I know if my herd is deficient in beta-carotene?

The easiest way is to check the color of the fresh colostrum. If it is a deep yellow to an even orange, the cows are supplied with sufficient beta-carotene. If it looks more ivory, this is a sign of a deficiency. Of course, a poor herd fertilization rate can also indicate a deficiency. If you suspect a beta-carotene deficiency, it is best to test some blood samples from your animal or use a testing device such as a carotene photometer. With such a test kit, you can determine not only the levels in the blood but also in the colostrum and the milk.

Feeding deficiencies

Feeding plays a major role in fertility issues. Too low input rates often have a negative effect on the health of cows. Feed quality and herd management have an impact on how long the cow loses weight after calving and at what point she gains weight again. One must always keep in mind the cows' feeding, energy balance, and nutrient supply because cows with a negative energy balance often do not show oestrus. It is also important that the silage is of high quality – poor silage inhibits fertility.

Follicle quality

The quality of the follicle is crucial for good fertility. The quality is influenced by the energy supply during the dry period and lactation during the first days. Since the follicles are already formed in the last days of gestation, a lack of energy during this period means that the maturation of the follicles – even with a better supply later on – can no longer proceed optimally and is ultimately inferior. This inevitably leads to a reduction of oestrus symptoms and minimizes the chances of successful insemination.

Prevention is key: 4 steps to improve fertility through feeding

1) Avoid stress in the feeding environment

Well-being and a high feed intake are the basis for high milk and fattening yields as well as healthy and fertile animals. Dry cows and transit cows particularly should only experience low stress. This means no overcrowding and generous feeding space, i.e., each animal should have its own feeding space. Feeding areas that are too narrow prevent the animals from eating, rank fights occur, and feed intake decreases.

Freshly lactating cows should be separated from the group. If the cows are in calving pens or calving stables, they should always have visual contact with the herd.

2) Optimize feed quality and rations

Feed quality and feeding management determine how long the cow loses weight after calving (negative energy balance) and at what point the cow gains weight again (positive energy balance). Optimal fertility performance can only happen when a positive energy balance is achieved.

The cow's fertility performance is primarily determined by nutrient supply and feeding. At the beginning of the lactation, high-quality basic feed with a high energy concentration should be fed, as feed intake is slow to get going after calving. Nevertheless, this ration should have sufficient structure. The amounts of concentrate should be divided into several individual portions and carefully increased. For high feed intakes, fresh water should be constantly available to the animals.

3) Treat diseases early to enable feeding

Diseases that lead to a reduced appetite should be treated as early as possible. In particular, attention should be paid to healthy hooves because a cow that has pain or difficulty getting up and walking is much less likely to go to the feed table.

4) Supplement vitamins, minerals, and trace elements

The needs-based supply of vitamins, minerals, and trace elements in every performance phase is a decisive success factor for good herd fertility. A sufficient supply of trace elements, especially selenium, manganese, zinc, as well as vitamin A and beta-carotene, are important for the formation of fertility hormones and optimal insemination success. At the same time, they ensure a high colostrum quality.

EW Nutrition's Fertilgol Bolus is a long-term bolus to support fertility. The high content of beta-carotene has a positive influence on the formation of the corpus luteum, the oestrus cycle, the quality of colostrum and sperm. The release rate of the ingredients beta-carotene, selenium, vitamin A, and other trace elements takes place over at least twenty days. Fertilgol Bolus can be used for female and male breeding animals shortly before and during the breeding or insemination period.