

Weaning without high levels of zinc and antibiotics – The Danish practical approach

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Background

The Danish pig production industry is characterized by high levels of health and productivity. In 2018, the Danish production reached 32.5 million pigs, of which 18 million were slaughtered in Denmark, while 14 million piglets were exported to mainly Germany and Poland for further fattening. The export of growing pigs began in 2004 and the demand for Danish weaners has increased annually. Because of the large export of pork and weaners, Danish pig farmers are continuously focusing on production costs to be competitive on the global market [1].

Awareness of prudent use of antimicrobials has been a focus point in the Danish pig production industry for the last 20 years. In Denmark, antimicrobial use in pig production has been subject to restrictions for more than 25 years and is regulated by government regulations and by voluntary initiatives by the pig industry. Any antimicrobials and zinc oxide used for the treatment of pigs can only be prescribed by authorized veterinarians after clinical inspection of the herd, batch or animal, and veterinarians are not allowed to benefit economically from any prescribed medical product. Other notable restrictions include a voluntary end to the use of growth promoters in 1999, restrictions on the use of critically important antimicrobials, and the Yellow Card initiative that defines the maximum herd-level use of antimicrobials. The result of these restrictions is a very low usage of critically important antimicrobials and an overall reduction in the annual consumption. In Denmark, the use of antimicrobials in the pig industry is declining annually despite an increasing production of pigs. Because of these strict regulations, antimicrobials have become a limited resource and future national targets for reducing the antimicrobial use in the Danish pig industry are expected [2].

The next challenge for the Danish pig industry will be the upcoming restriction on therapeutic use of zinc oxide. There is concern that the ban will lead to increased use of antimicrobials for treatment of post-weaning diarrhea. Currently, therapeutic use of zinc oxide is common in Danish pig production with an annual use of approx. 500 tons, and clinical outbreaks of post-weaning diarrhea are therefore rare in Danish pig herds [2-3].

Weaning without high levels of zinc and antibiotics

Given the potentially negative impact of zinc oxide on the environment, the European Union (EU) decided in June 2017 to withdraw the marketing authorizations for veterinary medicines containing zinc oxide by 2022 [4]. This has given the pig industry a maximum period of 5 years to find cost-effective alternatives to the therapeutic use of zinc oxide. Phasing out therapeutic use of zinc oxide requires knowledge about changes in management, housing, vaccine strategies and feed to secure cost-effective solutions without an increase in the need of antimicrobial use.

SEGES Danish Pig Research Centre has formulated a strategy including research projects concerning the weaning of pigs. The object of one of these projects is to describe the most common practical approaches on

Danish pig farms when phasing out the use of high levels of zinc oxide. A trial conducted by SEGES in 2017 demonstrated that it is possible to reduce the levels of zinc in weaner feed from 2,500 ppm to 1,500 ppm without compromising the health of the weaned pig [5]. This practice was subsequently implemented on many Danish pig farms resulting in a reduction in the national use of zinc oxide.

Some pioneer farmers have already phased out the therapeutic use of zinc oxide in weaner diets. Twenty-six of these pioneer farmers were interviewed using a questionnaire by SEGES on feeding regimes, hygiene measures, productivity, and antimicrobial use for weaners.

Farm characteristics

The study farms were largely representative of Danish farms in terms of production size and health status. The lactating period on the farms averaged 29.4 days and weaning weight averaged 6.9 kg/pig.

Weaner productivity (7 to 30 kg liveweight), defined as daily gain and feed conversion ratio, was comparable with the 2018 national average. Daily weight gain on the 26 study farms averaged 468 g/day (national average 2018 = 462 g/day) and feed conversion ratio averaged 1.78 FU/kg gain (national average 1.86 FU/kg gain). However, weaner mortality rates on the study farms averaged 2.1%, which is lower than the 2018 national average (3.1%).

The antimicrobial usage in the weaner period on the 26 farms was calculated as Animal Daily Doses (ADD) per 100 animals and as a 9-month rolling average. Records show large variations in antimicrobial use between the 26 farms. Consumption averaged 8.9 ADD/100 animals, which is lower than the 2018 national average for weaners at roughly 10 ADD/100 animals. On 15 farms, no pen level antibiotic treatment was used the first 14 days post-weaning.

Interventions made on the study farms that may explain how they manage to wean pigs without the use of zinc oxide

The following characteristics were identified on the 26 study farms that have phased out the use of a high level of zinc oxide in weaner diets:

PROTEIN LEVEL IN WEANER DIETS

High protein levels in weaner diets is a well-known risk factor of developing post-weaning diarrhea [6]. Information on the composition of feed used at the time of weaning revealed that on all study farms, the feed's protein content was below or within the general recommendation. The weaner diets contained averagely 136 g digestible protein per feed unit (min-max: 113 g to 146 g), and 18.7% crude protein. The recommended protein content in feed for 6-9 kg pigs was 140-152 g digestible protein per feed unit in 2018. The weaner diets contained averagely 10.8 g digestible lysine per feed unit, which is the first limiting amino acid. The recommended lysine content in feed for 6-9 kg pigs was 10.6 g digestible lysine per feed unit in 2018.

SPECIAL MEASURES TO INCREASE FEED INTAKE AFTER WEANING

A high feed intake immediately post-weaning is crucial to protect pigs against post-weaning diarrhea [7]. Twenty farms used the same feed before and after weaning, i.e. the pigs were introduced to the feed in the farrowing unit.

Post-weaning interventions were made on 24 farms aimed specifically at intake of and access to feed and water. This included extra water in troughs the first days, in some cases in combination with allocation of gruel feed several times a day. Furthermore, on many farms milk or feed was supplied in troughs, often

several times a day. The switch from one diet to another was gradual: on 19 farms the transition took place over more than two days, while the remaining switched over 1-2 days.

HIGHLY SKILLED FARM STAFF

Part of the questionnaire concerned the staff working in the weaner units. On twenty farms, the person in charge in the weaner unit had been employed for more than a year. On eighteen farms, this person had more than three years' experience in rearing weaned pigs. This indicates that experienced staff is a key element when weaning pigs without the use of zinc oxide.

BIOSECURITY

External biosecurity was practiced on the majority of the study farms. Twenty-two farms participated in the Danish Specific Pathogen Free (SPF) system, which includes defined rules on access of personnel and pigs to the farm. Internal biosecurity between sections and pens was practiced on 13 study farms including boot change between sections and separate tools used in each section to minimize transmission of infection between sections.

Conclusion

Experience from 26 farms shows that successful weaning of pigs without the use of zinc oxide requires an effort in several areas. These pig farmers had focus on feed intake around weaning and used weaner diets with a low content of digestible protein and a content of digestible lysine that complied with the recommendations. In general, the staff working in the weaner unit all have a certain degree of experience. External biosecurity was practiced on most of the study farms whereas internal biosecurity was prioritized to a smaller degree.

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