



Antibiotics Free Production

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Introduction:

The widespread use of antimicrobials in human and veterinary medicine in recent years has accelerated the emergence and spread of resistant microorganisms. This situation has been aggravated by the lack of investment in the development of new effective antibiotics. The severity of the consequences is obvious: it is estimated that each year, antibiotic resistant infections kill at least 25,000 patients and cost the EU € 1.5 billion in healthcare and loss of productivity (1). In order to remedy this situation, many countries have established strategies to contain the development of resistance to antibiotics, with a joint perspective: human and veterinary health. At the same time, the growing sensitivity of public opinion to the problems derived from bacterial resistance generates new demands for products and one of them is the meat of animals that have been raised without the use of antibiotics.

Is antibiotic-free production difficult to achieve?

Pork from pigs raised without antibiotics is paid more in the market and this has led some producers to consider its production. But raising animals without using antibiotics is not easy. Many farms have been in production for a long time and during this time their population has accumulated pathogens. The use of highly prolific new genetics has pushed systems to the limit and in many cases reduced the quality of a percentage of the pigs produced. Early weaning makes adaptation to solid diet difficult. Tight economic conditions in animal production have led to lower costs in all areas of production: the use of space is optimized to the maximum, they are fed to maximize their growth and, often, they are supplied with the minimum environmental conditions to keep the energy cost contained. Often, pigs are stressed under these conditions. Stress will weaken their immune response capacity, opening the door for infectious processes to happen and forcing to use antibiotics.

How to produce pigs without using antibiotics

Antibiotic-free production is not achieved simply by making the decision not to medicate but involves implementing changes in production conditions. We are going to see some of the essential points to be successful:

1. The farm, or at least the flow of animals produced, must be free of viral diseases, such as PRRS and Swine Influenza, which still lack highly effective vaccines.
2. It will be essential to know in detail what the health status of the farm is to be able, in this way, to design a complete vaccination program that allows to contain the majority of potentially pathogenic agents present. In some cases, where commercial vaccines are not available, the use of auto-vaccines could be an alternative, provided that these are based on a correct diagnostic and manufacturing process.
3. The health status of the herd has to be maintained stable. In order to reach this state of stability it would be preferable to produce its own-replacement or in case of purchasing it from an external source a long acclimatization period is recommended to have enough time to expose gilts to herd microbiota. First litter sows are often those responsible for piglet colonization (as for instance in *M.hyo* infection). Therefore, the use of multiparous sow's offspring will facilitate achieving production without the use of antibiotics.

Production results for P1 and P2 + progeny

	P1 offspring	P2+ offspring
Nursery mortality (%)	2.96	1.52
Nursery ADG (g/day)	430	465
Nursery Drug Cost (US\$)	1.37	0.53
Finishing mortality (%)	3.8	3.25
Finishing ADG (g/day)	795	820
Finishing Drug Cost (US\$)	1.07	0.77

(2) Adapted from Moore, C. 2005.

4. Cross-fostering should be considered an emergency tool and, when necessary, should be done within the first 24 hours of life and always between sows of the same batch. Reduced cross-fostering (MacREBEL management) have been shown to positively impact later stages health during PRRS outbreaks. Unfortunately, production is frequently prioritized over health and this is clearly seen in farrowing rooms where piglets are often cross-fostered regardless of their health status or the health status of the recipient sow. It has been shown that the movement of piglets or sows between different age groups is sufficient to infect a negative group with PRRS or Influenza (3), thus, the decision to leave only multiparous offspring as candidates for antibiotic-free production ruling out the pigs of primiparous would be completely useless if their piglets have previously been transferred.

1. Sow and piglet allocation pre-movement on adoption day

ROOM B



PRRSV STATUS SOWS -
PRRSV STATUS PIGLETS -

ROOM C



PRRSV STATUS SOWS +
PRRSV STATUS PIGLETS +

2. Sow and piglet allocation post-movement at the termination of the study

ROOM B



PRRSV STATUS SOWS +
PRRSV STATUS PIGLETS +

ROOM C



PRRSV STATUS SOWS +
PRRSV STATUS PIGLETS +

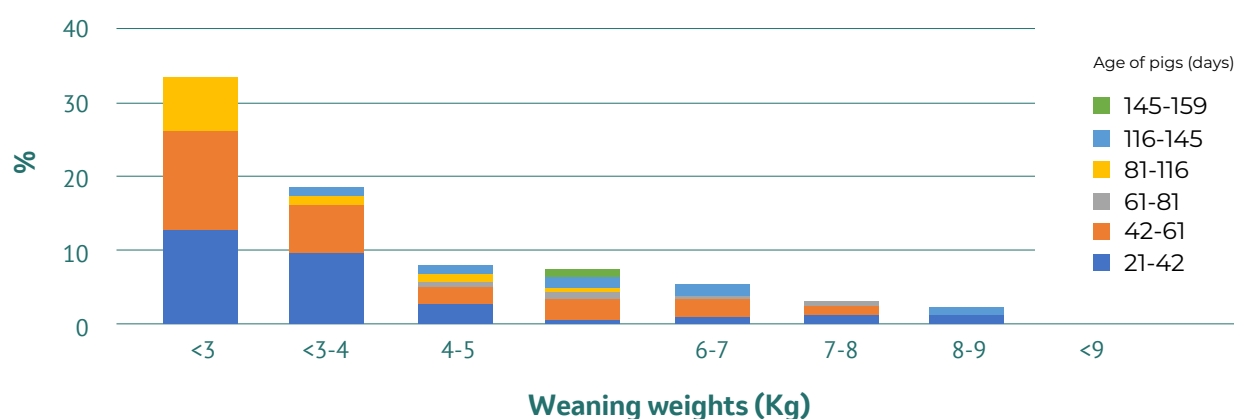
Figure 2 Porcine reproductive and respiratory syndrome virus (PRRSV) status of sows and pigs, and sow and piglet room allocation pre-movement on the day when adoption took place (1) and post-movement at the termination of the study (2).

Rooms B and C indicate the different rooms used during the study. PRRSV status positive (+) or negative (-) of the sow and litter is shown at the bottom of each room drawing.

(3) Garrido-Mantilla et al. (2020)

5. When using hyper-prolific sows, special care should be taken with low-birth-weight piglets, ensuring that they recover their body temperature quickly enough after farrowing, so that they are strong and vigorous to take in as much colostrum as possible. Pigs with the lowest 10% weights should not be selected for antibiotic-free production as they are the ones that suffer the most problems.

Mortality from weaning to market (159 days)



(4) Vidal, A. (2015)

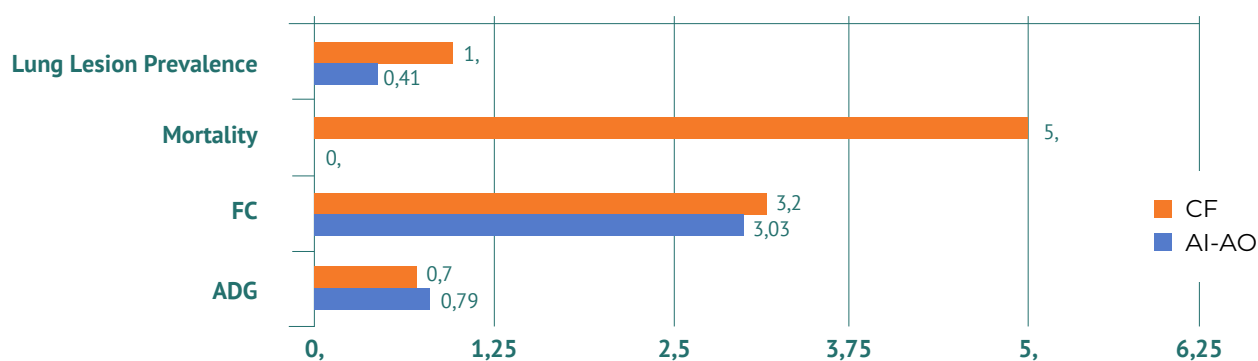
6. Late weaning, at 28 days or more, allows more time to adapt to a solid diet, reducing digestive problems that appear at weaning.

7. 15 to 20% more surface area per animal as well as more trough space should be provided, this will reduce competition among pen mates and therefore will also reduce stress, ensuring a tougher immune system. This additional space will also be necessary to separate individual pigs that may need antibiotic treatment and that will have to be correctly identified and sold on the traditional market.

8. Correct environmental conditions both with regard to ambient temperature, air speed, and air quality should be maintained. It is too common nowadays to meet environmental conditions during nursery or growing phase where air speed at the animal level is too high, this will reduce pig's thermal sensation and generates stress.

9. The correct practice of an All in-All out will be key to maintain the health status over time and for this, it is essential to maintain the batch's integrity. When the size of the farm is small, it is difficult to optimize the use of the facilities without having to resort to mixing animals from different batches. In these cases, the implementation of batch management systems can be highly recommended, as it will increase the batch size, facilitating the correct use of the facilities. In general, the longer the time span between batches, the more effective the system will be in breaking the dynamics of infection between different ages. But, in maintaining the batch's integrity, it is not enough to have well-defined batches; good biosecurity practices must also be applied to avoid the transmission of pathogens between different age groups. The use of group-specific injection equipment, hand washing between batches, and changing of boots and coveralls are some of the measures that should be common in practice.

Effect of AI-AO on respiratory disease and production



(5) Adapted from Scheidt AB, et al. (1995)

10. All in-all out will be totally inefficient in case it is not accompany by a good cleaning and disinfection between batches. Cleaning and disinfection have to focus specially on floors and walls up to where animals have access, but also troughs and drinkers which are often more difficult to clean properly as dirty water will remain on them. It is also important to remember that water lines should be disinfected between batches as pathogens can hide inside pipes biofilm having the possibility to infect new introduced pigs. App for example may use biofilm formation as a mechanism to survive in water lines (6).

11. Last but not least, a good nutrition and feeding program is needed.

Antibiotics-free production is possible, but it is not easy and will always be a more expensive way of producing pigs. Although the market prices for this meat are higher, it will be essential to accurately calculate the costs and profit margins obtained, as surprisingly they are not always higher than those achieved with traditional production.

References:

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