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Opinion

Antibiotics as Growth Promoters in Animal Production, A Challenge to Reason

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Introduction

The performance of current animal production systems depends to a large extent on the use of growth promoters. Since the 1940s, the use of antibiotics in sub-lethal concentrations was officially introduced to increase their productivity [1]. A technology supported by a chance fact and backed by empiricism: someone observed that animals whose diet contained abundant mycelium of *Streptomyces aureofaciens* with residues of chlortetracycline increased their growth [2]. This finding was associated with a favorable effect of the antibiotic on the intestinal microbiota [2]. Two hypotheses were immediately formulated. One substantiated the phenomenon: "antibiotics, by eliminating undesirable microorganisms (and their toxins) in the digestive tract of animals, provide a favorable environment for intestinal mucosa and thus a more efficient absorption of nutrients" [3]. The other opened doors to the exploitation of the discovery: "the use of antibiotics in sub-lethal concentrations does not constitute a sufficient pressure to generate resistance responses in bacteria" [4]. Both, in addition to having the approval of the powerful pharmaceutical industry and the growing community of animal producers at that time, were wrong [5].

Opinion

The first hypothesis, granting it the privilege of doubt, does not even classify as "half true". But it has had -and unfortunately has- support in mathematical terms: the figures support the undeniable increases achieved in the main production indicators as well as the decrease in costs attributable to this technology [6]. The second hypothesis, completely lacking in scientific support, managed thanks to the nonexistence of tools at that time that would prove otherwise. In this way they became paradigms of the great pharmaceutical industry of the 20th century and of this new form of animal production that was so promising [5]. A technology that, after eight decades damaging the animal-environment-human triad, still has followers. For this reason, despite the official prohibitions established since the beginning of the 21st century, individually producers, and some countries in their state strategies, turn a blind eye to this [7]. While others propose alternatives in which they define the antibiotics intended for this purpose. Something that, in more popular language, would be equivalent to "the same dog with another collar".

In general, those who for so many years have tried to prove the error of this technology have done so from the point of view that it imposes itself as a source for the continuous generation and growing of antibiotic-resistant bacterial strains. An undeniable phenomenon that undermines the effectiveness of animal and human antibiotic therapy. Something that, since the last century, became the invisible epidemic of the 20th century. A challenge that compelled the World Health Organization to convene a meeting to evaluate the consequences generated by the use of antibiotics as promoters in animal production. A chilling conclusion was reached: "the magnitude of the impact on medicine and public health of the use of antimicrobials in animal production is unknown" [8]. After such a sad conclusion, which does not lose its validity, rather it has worsened during the elapsed time, it is only worth reminding those who persist so obsolete the sarcastic phrase of Edqvist and Pedersen [9]: "antimicrobials as growth promoters: resistance to common sense".

Can Growth Promoters be Dispensed with in Bovine Production?

Of course not. As pointed out at the beginning of this proposal, the production levels demanded at present require additives that, without being nutrients, increase the efficiency in feed conversion, the average daily gain, the quality of the carcasses or the increase in production of milk from animals [10]. However, when making the selection of these promoters, crucial aspects of the animal physiology for which they are intended are not always valued and therein constitutes the main error that enables the adoption of inadequate strategies and solutions [5]. Calves at birth lack a mature immune system and depend on the passive protection received through colostrum. With this defense alone, they face the change from a sterile environment, typical of the maternal womb, to another abundant in microorganisms, many pathogens. These microorganisms, those acquired through breastfeeding and other foods offered, promote the formation of their intestinal microbiota. It is a crucial moment in which the decisions adopted can lead to two diametrically opposed results: a) the establishment of enteropathogenic entities. b) The adequate conformation of an appropriate and stable microbiota that prevents the previous risk [5]. The latter is not achieved in any way with the use of antibiotics in sublethal concentrations. For this, prebiotics, probiotics, postbiotics [11,12] or compatible microbial mixtures (efficient microorganisms -EM) [13] are required. To what was stated in the previous paragraph, it is worth adding that newborn calves do not behave like ruminants. It is necessary to feed them as monogastric animals. The liquid diet guarantees most of their nutrition until weaning, when they begin to consume enough dry diet, necessary for the development of the rumen. The liquid variant is the best route for the incorporation of probiotics or EM. They can be mixed with nutrients prior to consumption, or used for fermentation before offering them to animals. The second modality is cheaper, increases the quality and protein levels of the nutrient and its digestibility. Both options keep the intestinal microbiota in balance, stimulate protective immune responses at that level, limit the adhesion of enteropathogens and improve the animal's health parameters [13,14]. As a culmination, it is worth remembering that the solutions demanded by bovine production systems may be the simplest if they are approached from the One Health perspective. An approach where any irrational use of antibiotics finds no place [5].

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