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## Newsletter #2

### COST Action FA1401 “PiGutNet”

#### **Antibiotic and ZnO replacement in piglet diets. A view of the challenges and opportunities.**

In the recent years, the livestock production experienced a dynamic condition in which several changes has been imposed or recommended, to enhance its social (consumer acceptance and human health), environmental (reduce pollution, spread of antibiotics and AMR) and economic (reducing production losses due to animal health problems) sustainability. These modifications can be ascribed to the synergy of two factors: **(i)** scientific progress; **(ii)** modification of the cultural perception for the livestock production. The EU has been the pioneer for some of these changes. This is the case for the antibiotic reduction. Since 2011, the EU defined a road map to reduce the use of antimicrobials in human and veterinary medicine and, in the following years, several limitations have been introduced to effectively limit their use and the consequent occurrence of antimicrobial resistance in bacteria. It is undeniable that for long time antibiotics were commonly used as a production factor (e.g. AGP) in livestock and that until today, the availability of low-cost antibiotics for the prevention/treatment of pig diseases gave rise and incentive their misuse. Even if the AGPs were banned in EU, averagely the 70% of the sold antibiotics are used in livestock, and part of them are categorized as Highest Priority Critically Important Antimicrobials (HPCIA) for human medicine. The case of colistin, that was recently reclassified from WHO as HPCIA, is peculiar. Its use in livestock production was jeopardized in the EU (between 0 and 20 PCU), but only after the discovery of a new mechanism of resistance that allows the horizontal transmission of resistance, specific actions to disincentive its use has been widely adopted. Because the colistin was primarily used to counteract the post-weaning diarrhoea (PWD) in pigs, in several countries, the inclusion of pharmacological dose of zinc oxide (ZnO) in the weaning diets has been adopted as alternative strategy. Anyway, following the advice provided by EMA in 2016, the UE decide to forbidden the use of high dose of ZnO in 5 years. In some countries, the restriction for the use of colistin as well the limitation in the use of pharmaceutical dose of ZnO, pose serious concerns due to the uncertainty in the alternative approaches to counteract the PWD in piglets. From the other hand, this condition could be an opportunity to improve the farm management and concur in reducing the gap between EU countries for the animal welfare and antibiotics consumption. Basically, the association between welfare and health is well-known and in intensive production systems,

welfare problems in pigs often arise from an imbalance between the challenges animals are exposed to and their adaptive capacity. Several improvements can be made to favour the adaptation of the domesticated animals to these particular conditions. Technological and housing improvements coupled with specific strategies to increase the adaptive capacity of the animals to the confined rearing systems can have unexpected impact on animal health. In literature is confirmed the key role of gut microbiota for the immune system development and highlighted how early life stress can have a lifelong impact on the microbiota profile with consequences on both intestinal functions and other organs, including the brain, seriously affecting the host behaviour. An increasing body of evidence suggests that undesirable modification in microbiota-gut-brain axis can affect the maturation, morphology, and immunological function of the resident macrophage-like cells of the brain that in turns increases the risks for stress-related disorders. The future approach to welfare and health needs to disentangle the mechanisms that link the gut microbiota, immune, and central nervous systems in a network of communication that impacts behaviour patterns.