Copper reduction in piglet feeds: how do you stimulate feed intake?

Since February 13th 2019, the copper content of premixes for piglet feeds has been reduced to provide 140ppm in prestarter feeds and 90ppm in starter feeds in accordance with the new maximum content allowed in the EU.

Feed manufacturers have until August 13th 2019 to comply with the new European regulation on the sustainable management of copper in piglet feeds. This article outlines CCPA Group's strategy to maintain animal performance with reduced copper use.

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Copper use in feeds raises concerns about environmental and health issues and in July 2018, a new European regulation on the copper content of animal feeds was published.

The major part of the copper added in pig feeds is excreted in manure and spread on soils.

Unfortunately, the abundance of this trace-element, which accumulates in the soil, can degrade its fertility and plant growth.

In addition, pig intestinal microbiota is also affected, as a high-dose of copper can be involved in a co-selection mechanism which promotes antimicrobial resistance.

Copper restriction adopted by EU legislation

The requirement of copper for piglets up to 25kg is estimated between 6-8ppm. This low level of input supports the essential functions. Copper is indeed a co-factor of enzymes that acts on a wide range of physiological functions: immunity, antioxidant defences, respiratory chain.

At a higher dosage, copper has a growth promoting effect in piglets with a main action on appetite stimulation. The absorbed copper is active at the systemic level and is involved in the appetite regulation mechanisms.

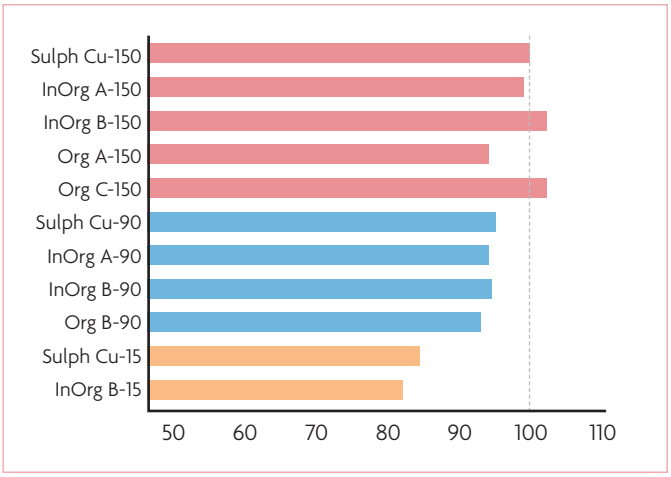
Copper probably has an effect on the secretion of growth hormone. In the digestive tract it helps to regulate the microbiota and improve the animal's immune status.

Despite these known effects, in 2003, a first European regulation was adopted to limit copper content in the feed of fattening pigs to reduce the environmental impact.

The permitted copper content in feeds decreased from 100ppm total to 25ppm total. As a continuation, EFSA published an opinion in 2016 recommending the maximum permitted copper content to be reduced from 170ppm to 25ppm for piglets up to 12 weeks of age.

This EFSA opinion has subsequently generated a lot of discussions between industry and the European authorities. The feed industry and livestock sector have argued that drastic limitations of copper levels for piglets could lead to reduced performance, increased digestive problems and potentially increase the use of antibiotics or a high dose of zinc oxide in the post-weaning phase.

Fig. 1. Average daily feed intake in starter phase for different inorganic (Inorg) and organic (Org) sources of copper and different doses (15, 90 and 150ppm). Base 100 = Sulph-Cu 150 (CCPA station trials).



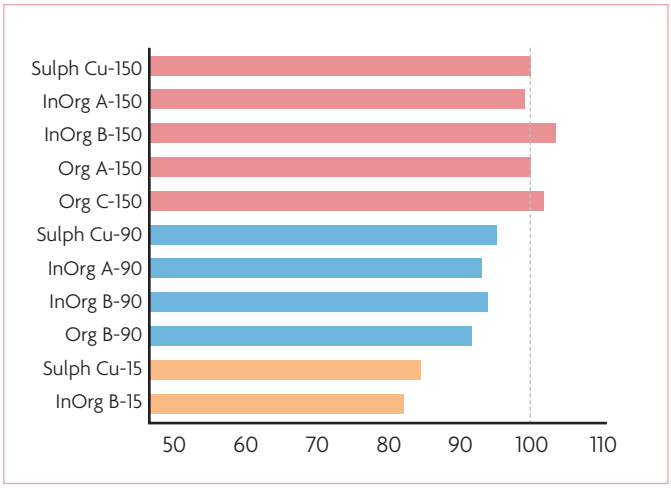


Fig. 2. Average daily gain in starter phase for different inorganic (InOrg) and organic (Org) sources of copper and different doses (15, 90 and 150ppm). Base 100 = Sulph-Cu 150 (CCPA station trials).

Two steps in copper reduction for piglets

Europe has heard the opinions of the industry and has introduced a degressivity of the reduction of copper content in its regulations: from the suckling phase to four weeks after weaning, the permitted level is now 150ppm in total. From 5-8 weeks after weaning, the maximum level is 100ppm in total. After eight weeks after weaning, copper intake should be limited to 25ppm. This change in regulation frame (expressed according to weaning time and not to the age of piglets) does not exactly fit with the practical duration of use of the different piglet feeds. Nevertheless, it seems difficult to change the actual post-weaning feed programs to follow the permitted copper content breakdown.

Before knowing the final thresholds set by this regulation, CCPA Group has conducted several post-weaning trials in its experimental farm since 2016.

For the prestarter phase, the decrease of 20ppm of copper (170 down to 150) will not result in an apparent reduction of performance according to the trials results.

However, for the starter phase, the trials indicate that a reduction from 170 to 100ppm will result in a decrease of performance: -4% of feed intake, -4% of ADG, +2% of FCR.

In the field, we can probably expect a decrease of feed consumption higher than 5%, according to the sanitary status of the farms.

In these trials, CCPA Group also recorded the individual antibiotic treatments administered and found an increase of digestive disorders and a higher number of antibiotic treatments for the low copper group

Continued on page 14

Continued from page 13
(+20%). These results highlight the role of copper in gut health.

Which alternatives?

To deal with this new situation, CCPA first questioned the interest in using copper sources with higher bioavailability. Besides the use of copper sulphate, other inorganic sources (dicopper oxide and copper trihydroxy-chloride) are available. As organic sources, different chelates of copper are also authorised.

To evaluate their interests, CCPA Group tested different copper sources for the starter phase to add 15, 90 and 150ppm of copper.

For feed intake and growth performance in the starter phase, the different sources, adding 90ppm of copper, gave similar results to 90ppm of copper from sulphate (see Figs. 1 and 2).

CCPA Group also tried to work on nutrient concentration of the feed to face the reduction of performance. Increasing net energy concentration and/or amino acids concentration by 5% would result in an increase of feed cost between €4-12/ton. Actually, this formulation change does not guarantee a maintenance of performance, as piglets can regulate feed intake according to energy concentration. Furthermore, the increase of amino acids concentration implies a higher crude protein content with the risk of this leading to more digestive disorders.

CCPA Group has also explored another way to stimulate ingestion, by increasing tryptophan concentration, known for its positive effect on feed intake. A trial was conducted in the new regulatory context (90ppm of added copper) with increased tryptophan concentrations in starter feeds.

The increased tryptophan levels did not show any improvement in feed intake or piglet growth.

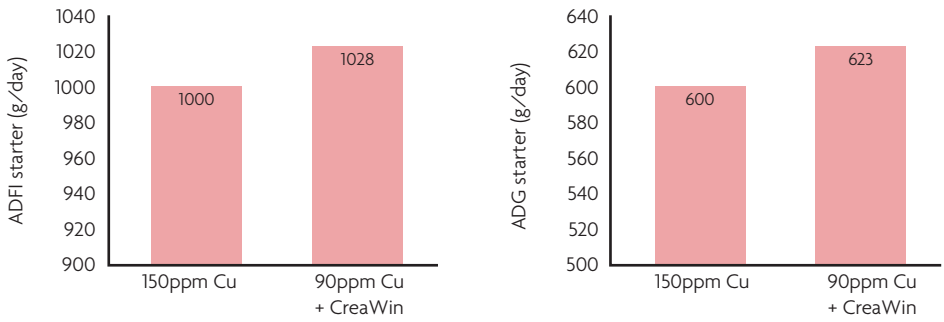


Fig. 3. Average daily feed intake (ADFI) and average daily gain (ADG) for the starter period with different feeds (CCPA field trials, 2019).

CreaWin solution

After these results, CCPA Group focused on the objective of stimulating ingestion and growth and improving feed efficiency and has developed a feed solution named CreaWin.

This solution is formulated with plant extracts: piperine and fenugreek. Piperine has an effect on stimulating digestive secretions. Fenugreek also has an effect on appetite stimulation.

CCPA Group tested this solution in three trials on its experimental farm for the starter period and has validated it with field trials.

On average, the addition of CreaWin improves feed intake by 4%, average daily gain by 6% and the feed conversion ratio by 2%.

The last field trial compared a starter feed with 150ppm of copper added and a feed with 90ppm of copper + CreaWin.

For the low copper feed, CreaWin enables better performances to be achieved than with the high copper feed (+3% feed intake, +5% growth, -2% feed efficiency) (see Fig. 3).

With this decrease in copper content, CCPA Group also recommends taking care of the digestive security of your piglet feeds. ■