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PARTNER NEWS
Tecnozoo appoints Biovus Ltd as distributor

Tecnozoo recently appointed Biovus Ltd, a young and innovative company specialising in animal nutrition, to be its distributor in Bangladesh and Nepal. Biovus will market Tecnozoo’s line of poultry products including Formik Stop, Toxistop, Adiresp, Tecnoentero, Tecnoimmuno, Coxi Stop, Spore Plus, Glucon Plus and Pluriacid, and the dairy line.

Roberta Vanzetto, Regional Manager Asia Pacific of Tecnozoo, commented, “We are pleased to work with the reliable team at Biovus, who also shares the same values as Tecnozoo to innovate and offer quality products to the livestock market.”

Animine strengthens team in Asia

Animine, a global supplier of value-added sources of trace minerals to the feed industry, has recently welcomed a new member on board the team - Dr Jinxiao Zhang.

As the Technical Support Lead for Asia Pacific, Jinxiao is in charge of technical support to distributors and key accounts, as well as overseeing trials and scientific experiments with opinion leaders. With a decade of experience in the feed additives industry working for global suppliers, Jinxiao will kickstart his role with a focus in the China market.

PRODUCT UPDATE
Normoterm Orac - control impact of oxidative stress in ruminants with positive impact on fertility

A trial done in Tárnok, Hungary confirms the efficacy of Normoterm Orac in increasing pregnancy rate, conception rate and total antioxidant status in dairy cows.

| Objective | To confirm the efficacy of a product containing antioxidant active ingredients given during calving and during the first 30 days of lactation in Holstein cows |
| Where     | Agrifutura Real Kft Dairy Farm in Tárnok, Hungary |
| When      | July to November 2016 |
| Method    | 600 dairy cows 300g/head - within the first 12 hours after calving, in the drench 500g/head/day - for 30 days after calving, mixed in the TMR |
PRODUCT UPDATE
Normoterm Orac - control impact of oxidative stress in ruminants with positive impact on fertility
(continued)

Effects on Pregnancy Rate, Voluntary Waiting Period 50 days

(+4.2 days)

16.1  20.3

Pregnancy Rate

Effects on Conception Rate, Voluntary Waiting Period 50 days

(+6.4 days)

37.3  43.7

Conception Rate

Effects on Total Antioxidant Status

Made in Italy by Tecnozoo, Normoterm Orac is a complementary feed for cattle, sheep and goats. For more information, please email info@linkasiapartners.com.
By Valérie Kromm and Stéphane Durosoy, Animine

CoRouge®, the red source of cuprous oxide, newly authorized in the EU, has been introduced in the previous issue (Feed Compounder November/December 2017). This monovalent source of copper is characterised by superior technological properties but also by some specific chemical properties differentiating it from other feed grade source of copper. High bioavailability and improved animal performance have been shown in University studies.

Highest copper concentration
As the copper content is the highest in CoRouge® (75%), it offers many advantages for the feed industry:
- less space in premixes
- less warehousing
- less transportation

Like other metallic compounds, copper compounds are highly regulated feed additives. They are classified as hazardous chemicals according to the Regulations on Classification, Labelling and Packaging (CLP). The new CLP classification of copper based products shall apply from 1 March 2018 (Table 1).

The highest Cu concentration in CoRouge® is of special interest for premix manufacturers who are concerned by Seveso III Directive. Replacing other Cu sources by CoRouge® gives an opportunity to decrease the quantity of stored products which are classified as dangerous for the environment. This is even more critical with the current replacement of ethoxyquin, recently banned, by classified synthetic antioxidants.

Lower contamination levels in heavy metals
All copper feed grade sources must comply with stringent regulation on undesirable substances. Heavy metals and dioxins are the most critical risks for the feed and food chain. The higher the copper concentration, the lower the contribution to contamination in the feed. Table 2 illustrates this advantage with the example of lead.

<table>
<thead>
<tr>
<th>Chemical form</th>
<th>CAS Number</th>
<th>Corresponding CLP pictograms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper(II) oxide (CoRouge®)</td>
<td>1317-39-1</td>
<td><img src="" alt="CLP pictograms" /></td>
</tr>
<tr>
<td>Copper sulphate pentahydrate</td>
<td>7758-99-8</td>
<td><img src="" alt="CLP pictograms" /></td>
</tr>
<tr>
<td>Dicopper chloride trihydroxide (TBCC)</td>
<td>1332-65-6</td>
<td><img src="" alt="CLP pictograms" /></td>
</tr>
<tr>
<td>Copper carbonate</td>
<td>1184-64-1</td>
<td><img src="" alt="CLP pictograms" /></td>
</tr>
<tr>
<td>Copper chelate of amino acids</td>
<td>No chemical formula</td>
<td><img src="" alt="CLP pictograms" /></td>
</tr>
<tr>
<td>Copper chelate of glycine</td>
<td>To be determined</td>
<td><img src="" alt="CLP pictograms" /></td>
</tr>
<tr>
<td>Copper chelate of hydroxy analogue of methionine</td>
<td>To be determined</td>
<td><img src="" alt="CLP pictograms" /></td>
</tr>
</tbody>
</table>
A new choice for using copper in pig feeds - part 2
(continued)

Table 2 - Lead concentration in feed grade copper sources. *Benchmark at 100%

<table>
<thead>
<tr>
<th>Copper concentration (%)</th>
<th>Maximum authorised Pb concentration (ppm)</th>
<th>Relative contribution to lead content in the feed (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper sulphate, pentahydrate*</td>
<td>25%</td>
<td>100</td>
</tr>
<tr>
<td>Copper chelate of amino acids</td>
<td>15%</td>
<td>100</td>
</tr>
<tr>
<td>Copper blysinate</td>
<td>15%</td>
<td>100</td>
</tr>
<tr>
<td>Copper chelate of hydroxy analogue of methionine</td>
<td>18%</td>
<td>100</td>
</tr>
<tr>
<td>Copper chelate of glycine</td>
<td>25%</td>
<td>100</td>
</tr>
<tr>
<td>Dicopper chloride trihydroxide</td>
<td>55%</td>
<td>100</td>
</tr>
<tr>
<td>Copper carbonate</td>
<td>55%</td>
<td>200</td>
</tr>
<tr>
<td>Copper(I) oxide (CoRouge®)</td>
<td>75%</td>
<td>200</td>
</tr>
</tbody>
</table>

Non-water soluble copper source
There are many advantages in favour of non-water soluble compounds, under the condition that they are enough solubilized in the proximal part of the digestive tract for intestinal uptake. Copper sulphate is well known for its hygroscopicity.

Metal sulphates are water soluble compounds and as such they can create negative interactions in the premix and in the gut. Already in the early 2000’s, it had been shown that metal oxides were less aggressive on vitamin stability when mixed in vitamin/mineral premixes.

Since, vitamin manufacturers have improved their stability so that they are less sensitive to negative effects from other compounds and from storage conditions. However, a recent study showed that vitamin A is 12% less degraded in a typical premix for piglet feeds when mixed with Animine products (potentiated zinc oxide HiZox® and CoRouge®) than with zinc and copper sulphate, even at a mild temperature of 25°C (see Figure 1).

Attention given to vitamins stability in premixes and feeds is even more critical after the ban of ethoxyquin, and especially when vitamins levels are reduced due to extremely high prices or product shortage.

Less antagonism with phytase
Minerals like calcium, zinc, copper and iron may bind to phytic acid, thus lowering its solubility in the digestive tract. If such antagonists rapidly chelate phytate after ingestion, then its hydrolysis by endogenous or supplemented phytase will be impaired. This negative interaction will be severe in such conditions:
- by the supplementation of high dosages of trace minerals,
- by the supplementation of readily soluble sources like sulphates,
- when supplemented phytase is slow acting.

Phytic acid has a strong affinity to bind with di and trivalent forms of minerals. At the difference with other copper compounds, dicopper oxide is a monovalent form of metal. With a non-water soluble and monovalent source of copper, CoRouge® is less likely to negatively interact with the release of phytic phosphorous. This has been shown in an in-vitro study performed by the University of Barcelona, Spain (see Figure 2).
**Direct intestinal absorption**

Active absorption of copper involves various intestinal transporters, the most important one being CTR1. Copper absorption depends on its oxidation state. Uptake of copper by CTR1 is possible only with the monovalent form of the copper ion, i.e. the cuprous form Cu⁺. However, other copper sources authorised in animal nutrition include copper ions in the divalent form, i.e. the cupric form Cu²⁺. Consequently, some membrane proteins are needed to reduce Cu²⁺ into Cu⁺; currently, these proteins are not fully identified, but the main hypothesis refers to Steap proteins, like Steap2, also identified as Fe³⁺ reductase. A monovalent form of copper supplied from CoRouge® will be directly absorbable, thus less prone to interferences (see Figure 3).

**High bioavailability**

In recent years, EFSA Journal has published several Opinions on the bioavailability of copper compounds. In 2008, it was concluded that copper chelate of hydroxy analogue of methionine had a bioavailability comparable to copper sulphate in broilers. In 2013, no evidence was confirmed that the bioavailability of copper chelate of amino acids would be higher than copper sulphate. In 2014, an equivalent bioavailability was shown between copper bilysinate and copper sulphate.

The high bioavailability of dicopper oxide in CoRouge® has been verified in Laboratory animals and in farm animals. In comparison to livestock, it is much easier to deplete rats in copper, and to measure how dietary sources can replete animals. Such experimental protocol is necessary when we lack sensitive biomarkers of mineral status. This has been realized at the University of Florida under the supervision of Dr Jamie Collins. Measured with liver concentration and serum ceruloplasmin activity, copper status of rats was equivalent between copper sulphate and CoRouge®.
The high bioavailability of dicopper oxide has been demonstrated also on piglets and broilers, when supplied at low dosages. An experiment performed at Wageningen University (Netherlands) showed that copper concentrations in plasma, liver and bile were equal when piglets were fed either copper sulphate or CoRouge®. A similar study was carried out on broilers in Barcelona University. Results obtained with copper sulphate were not different from those obtained with CoRouge® (see Figure 4).

At nutritional levels, it is confirmed that the monovalent form of copper oxide shows high bioavailability for the animals, comparable to copper sulphate or chelated compounds.

**Growth performance of piglets**

The growth promoting effect of copper supplementation on weaned piglets is well documented, but its mode of action is not yet fully elucidated. Copper is known for its antibacterial action and this remains the most assumed effect on intestinal health. Ionic form may play a role, as antibacterial activity of Cu⁺ ions has been shown stronger compared to Cu²⁺ ions.

It is generally perceived that the growth promoting effect of some additives such as copper is limited under good nutritional and management practices. However, this has not been confirmed in two recent experiments supervised by Dr Paul Bikker of Wageningen University. The first experiment tested different copper doses, from 15 to 160 mg/kg supplied as copper sulphate.

**Dose response**

A dose-response effect was confirmed for growth performance: average daily gain (ADG) increased as Cu dose increased (p<0.01), while feed conversion ratio decreased (p<0.01). Piglet weights were improved by 2.8 kg after 40 days of supplementation: it is very unlikely that most feed additives can achieve such performance.

The most recent study was also performed on a high number of animals. 600 piglets, weaned at 26 days, received two wheat/barley/maize based diets, a prestarter (17% CP) for two weeks followed by a starter diet (15%) for three weeks. There were no medicated zinc oxide or antibiotics in the feeds. The experiment compared different doses of copper, supplied either with copper sulphate or with CoRouge®.
At 14 days of supplementation, a clear dose response was already observed, with CoRouge® fed piglets growing faster. After 35 days of supplementation, piglets gained 3.3kg weight when fed 160 mg/kg of copper in comparison to 15 mg/kg. Piglets which received 160 mg/kg Cu from CoRouge® achieved even higher final BW at 21.4 kg, resulting from improved feed intake and feed conversion ratio.

To conclude, the beneficial effect of high Cu dose on piglet weight gain is still exceptional, and this effect is maximized with CoRouge® (see Figure 5).

If in the future European authorities decide for a drastic decrease in Cu supplementation in piglet diets, growth performance would be significantly impaired. However, at 15 mg/kg Cu, piglets fed CoRouge® would gain 800g more BW in comparison to copper sulphate after 5 weeks of supplementation.

Growth performance of poultry
In the European Union, dietary copper is supplied for poultry up to a maximum of 25 mg Cu/kg, which is higher than animal requirements estimated at less than 10 mg/kg according to scientific bodies. In other regions, inclusion of 125 to 250 ppm copper sulphate as growth promoting agent is quite popular if allowed. However, literature shows variable results from high copper sulphate supplementation levels on broiler performance. These effects can be positive, neutral or even negative. This response has been recently tested in Barcelona University, not only with copper sulphate but also with CoRouge® at 2 levels of supplemented copper: 15 and 150 mg/kg. 384 one day male Ross broilers were raised with 12 chicks/pen and 8 pens/treatment. Body weight and feed intake were recorded weekly. After 35 days of supplementation at 150 mg/kg, only CoRouge® increased growth performance (see Figure 6).

Growth of birds fed 15 or 150 mg Cu/Kg as copper sulphate was not affected. Only supplementation with 150 mg Cu/kg as CoRouge® improved feed efficiency, resulting in increased final BW. Further studies are planned to better understand how the source of copper can impact broiler performance.

Conclusion
Copper is an essential nutrient for livestock animals, but is also under scrutiny of authorities due to its possible effect on environmental accumulation and development of microbial resistance. The feed industry is forced to improve current practices in order to find a compromise between animal performance and sustainability. Despite widespread usage since decades, the modes of action and dose responses of copper supplementation are still debated. New doses and sources of phytase raise new questions on interactions with macro and microminerals. With the authorisation of dicopper oxide (CoRouge®), nutritionists have a unique opportunity to utilise this innovative source of copper and to comply with regulatory changes in the European Union.
EVENTS REVIEW
ILDEX Vietnam 2018

ILDEX Vietnam 2018 delivered international success as the 3-day trade exhibition held from 14 to 16 March welcomed over 8700 participants from 47 countries around the world, including Malaysia, Korea, China, Thailand, Singapore, India, Japan and more. Agromed and Animine exhibited in the show and would like to thank all who dropped by the booth.

AGRANA Asian Distributors Meeting 2018

AGRANA held its inaugural Asian Distributors Meeting on 19 and 20 March at the Park Plaza Soi 18 in Bangkok. Over 20 participants from the Asia Pacific region were present including Australia, China, India, Malaysia, Philippines, Thailand and Vietnam. Interesting and practical information was being shared during the meeting, such as the current market challenges, review of ActiBeet launch in Asia Pacific and customer feedback.

AGRANA and distributors during the group dinner
EVENTS REVIEW
AGRANA Asian Distributors Meeting 2018
(continued)
EVENTS REVIEW
Animine Asian Distributors Meeting 2018

Animine held its 4th Asian Distributors Meeting on 25 March at the Aloft Bangkok where it hosted partners from China, Malaysia, Taiwan, Thailand and Vietnam. Latest product information on HiZox® and CoRouge® was presented, including sharing of field experiences and success stories around the region.
EVENTS REVIEW
Poultry / Pig / Dairy Focus Asia Conference, Bangkok, Thailand

Pig, Poultry and Dairy Focus Asia 2018 is the leading technical conference for the Asian pig, poultry and dairy sectors. Held over 21 to 23 March in Bangkok, the event is a respected and independent technical conference for the livestock industry. Speakers from Agrana, Agromed, Animine and Tecnozoo presented various timely topics in all three segments of the conference.

Tanja Calitz, ACE Livestock Consulting Pty Ltd

Kostas Lymperopoulos, Animine

Arthur Kroismayr, Agromed

Ana Gavrau, Agrana

Farzin Faraji, Tecnozoo

Cristiano Ossensi, Tecnozoo
EVENTS REVIEW
11th Asian Pacific Poultry Conference (APPC 2018)

The APPC was held from 25 to 27 March at the Athenee Hotel in Bangkok. Expert speakers and participants around the region attended this valuable poultry conference that presented up-to-date and practical information. From Animine, Agathe Roméo presented the topic “Effect of dietary zinc on *C. perfringens* challenged broilers (Southern Poultry Research, USA)”.

![Image](image.png)

Agathe Roméo, Animine

EVENTS UPCOMING
VIV Europe 2018, Jaarbeurs-Utrecht, The Netherlands

VIV Europe will be taking place at Jaarbeurs-Utrecht, from 20 to 22 June. This 2018 edition of VIV Europe features a strong and engaging theme for its “Sharing Data = Better Poultry” - how to achieve a new level of poultry production to be proud of.


Tell us what you think!

We are always looking at ways to improve this e-newsletter and we welcome your feedback and suggestions.
Please send your comments to info@linkasiapartners.com.