

# MERIDEN ANIMAL HEALTH TECHNICAL BULLETIN

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## **Antimicrobial Sensitivity Testing & Heat Treatment on Orego-Stim<sup>®</sup> Powder**

### **Meriden Animal Health Internal Laboratory**

An experiment was conducted at the Meriden Animal Health Internal Laboratory to evaluate the efficacy of Orego-Stim<sup>®</sup> Powder on the inhibition of bacterial growth on cultured Mueller Hinton (MH) agar plates, with and without undergoing the heat treatment process. The MH agar plates were cultured with a selected field strain of *Escherichia coli* that was resistance to amoxicillin, ampicillin, enrofloxacin, norfloxacin, apramycin, doxycycline, neomycin and colistin. Orego-Stim<sup>®</sup> Powder showed an extensive zone of inhibition on the cultured MH agar plate, which proved to be very effective against the antibiotic-resistant strain of *E. coli*.

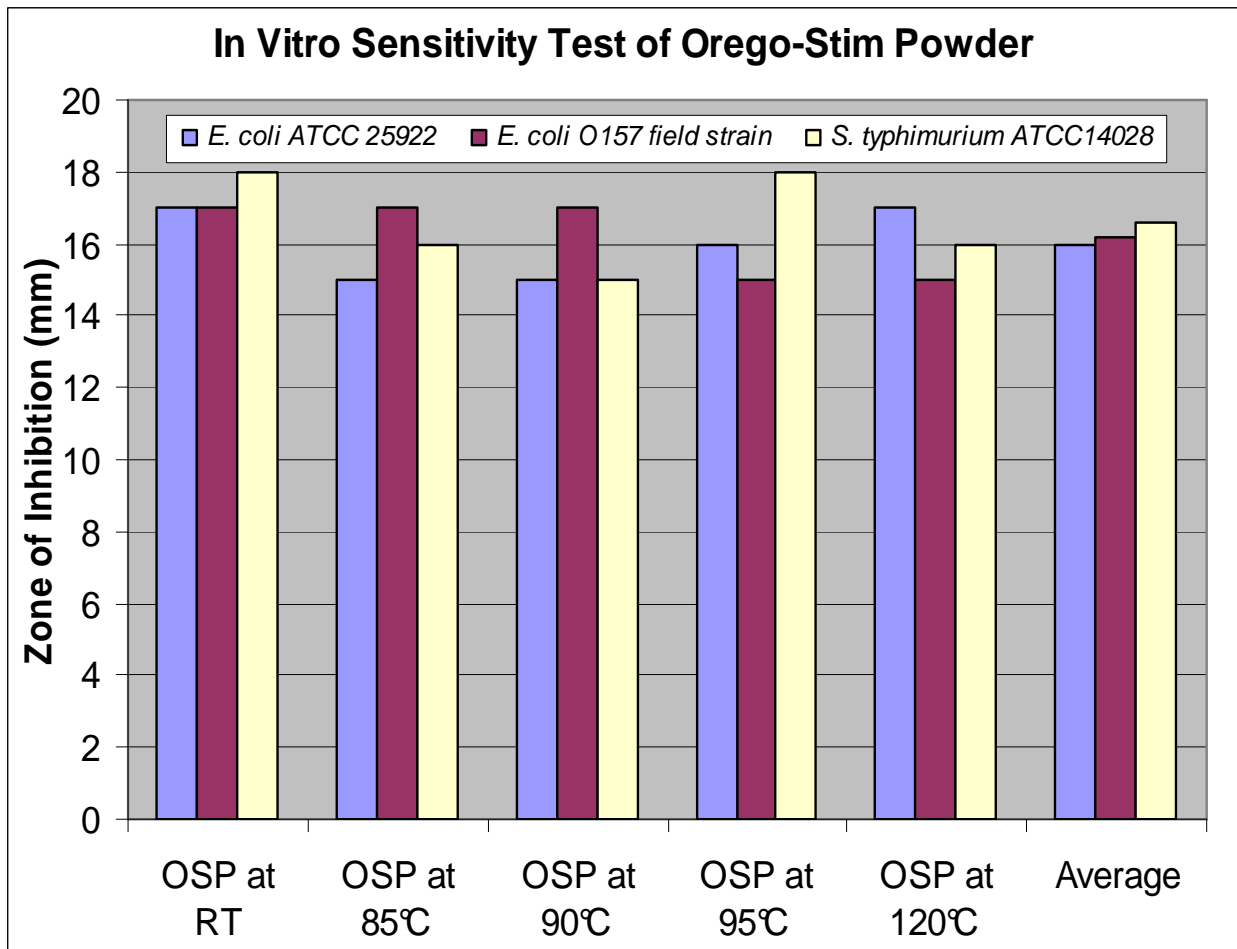
When Orego-Stim<sup>®</sup> Powder was heat treated to temperatures of 90°C, it showed the same area of inhibition as the non heat-treated control. This clearly shows that the heat-treated Orego-Stim<sup>®</sup> Powder was just as effective as non heat-treated Orego-Stim<sup>®</sup> Powder against the multi drug-resistant strain of *E. coli*.

### **University Putra Malaysia**

A similar experiment was conducted at the Veterinary Laboratory Services Unit (VLSU), Faculty of Veterinary Medicine, Universiti Putra Malaysia (UPM) by Associate Professor Dr. Abdul Rahim Mutalib. In this experiment, Orego-Stim<sup>®</sup> Powder was heated for 5 minutes at temperatures of 85°C, 90°C, 95°C and 120°C before applying these sample respectively onto MH agar plates swabbed with a selected strain of *Escherichia coli*, *Salmonella typhimurium* and *E. coli* O157 versus a non-heat treated Orego-Stim<sup>®</sup> Powder control group that was maintained at room temperature (RT).

The results of the experiment, measured in terms of zone of inhibition (mm) are shown in Figure 1.

Figure 1: Bacterial sensitivity testing of Orego-Stim® Powder at different heat-treatment temperatures against three different strains of pathogenic bacteria.



### Is There Really A Need For Encapsulation?

It has been said that the encapsulation of certain feed additives brings about certain benefits such as providing heat stability, delivery of active ingredients directly to the target organ, a controlled release of such substances at the target site and minimising losses that occur due to the acidic conditions of the stomach. It has also been thought that essential oils and phytogetic substances were not suitable for heat treatment during the pelleting process, which is essential in the manufacture of feed pellets.

However, because Orego-Stim<sup>®</sup> Powder displays such remarkable stability towards heat treatment, it is suitable not only for the pelleting process at temperatures of up to 90°C, but even for extrusion at temperatures of up to 120°C. The fact that Orego-Stim<sup>®</sup> Powder is heat stable negates the need for encapsulation, which actually hinders the aromatic properties of the natural plant compounds within Orego-Stim<sup>®</sup>. Because OS is not affected by pH, acidity or enzymes, it is relatively stable and will pass through the stomach with no changes to the molecular structure of the active constituents.

Orego-Stim<sup>®</sup> contains a characteristic class of compounds known as isoprenoids that contribute greatly to the flavours and fragrances of essential oils and phytochemical substances. That is why these plant-derived substances are widely used for human food flavouring and act as natural appetisers. The compounds within Orego-Stim<sup>®</sup> stimulate olfaction and taste by acting on the central and autonomous nervous system, triggering a response in the gastrointestinal tract by increasing its motility and activating the enteroendocrine system to produce digestive enzymes.

These physiological processes result in stimulation of the animal's appetite, increase in salivation and subsequently an increase in feed consumption, while the release of higher levels of digestive enzymes plays a crucial role as biological catalysts that break down nutrients to more basic units that can be absorbed through the intestines to be used for the growth process. The digestion and absorption of nutrients from the feed are paramount for optimum growth rates of the animal.

On the other hand, there are also various products in the feed additive industry comprising active ingredients that are 'nature identical', or in other words, synthetically-produced. Examples of such are those that use only a combination of carvacrol and thymol in mysterious and unproven ratios. Such products may therefore have a vital need to encapsulate the synthetically-produced active ingredients in order to mask the unfavourable odour and chemical taste that results, the very factors that deter animals from their feed and which differ greatly from the aromatic scents and tastes that one would get from natural plant extracts.

This very distinctive and natural aroma of Orego-Stim<sup>®</sup> is much favoured by livestock animals, especially pigs, and it plays an important role in appetite stimulation, which results in an increase in feed consumption. This is because Orego-Stim<sup>®</sup> contains pure, unadulterated essential oil with a

naturally-balanced ratio of more than thirty different active constituents. These very compounds give Orego-Stim<sup>®</sup> a unique and distinctive taste and smell that appeals to most animals.

Furthermore, there is scientific evidence that the antimicrobial activity of Orego-Stim<sup>®</sup> is greater than the additive effect of just its two major components, carvacrol and thymol. In fact, the other minor components that exist naturally in this essential oil play a significant role not only in its antimicrobial properties, but various other value-adding characteristics and benefits as well. Products that are encapsulated do not have any aromatic effect and therefore possess no appetite stimulating properties. Besides, encapsulation adds a high and unnecessary increase in the manufacturing costs of feed additives.

## **Conclusion**

The experiments clearly proved that Orego-Stim<sup>®</sup> Powder was highly effective against the multi drug-resistant strains of bacteria such as *E. coli* and *Salmonella*. Even after heat treatment, Orego-Stim<sup>®</sup> Powder was just as effective as non heat-treated Orego-Stim<sup>®</sup> Powder against the same pathogenic bacteria. Therefore, encapsulation of Orego-Stim<sup>®</sup> is not at all necessary, but rather, this process is seen as a disadvantage, especially in terms of hindering the natural flavours, scents and appetite-stimulating properties that this phytogetic feed additive brings.



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