Reducing swine backfat thickness: the answer is in nature

Pig farming is constantly changing. Since the 1970s, new knowledge and technologies have been continually added to farming routines.

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Pig farming intensification started in Europe during the 1970s with farms adopting practices that increased production efficiency (kg of meat), while using less resources (space, time, labour, feed, etc).

Obtaining excellent production results, along with constantly enhancing and identifying the limiting factors in order to achieve these indexes, became crucial for pig-related farmers and technicians.

Thus, indexes such as the feed conversion rate daily weight gain, carcase yield, absence of disease, and low mortality in every production phase were always considered crucial targets in modern pig farming.

During these phases, gaining the maximum amount of weight in the shortest time possible and by consuming the least amount of feed is the goal. Accelerating weight gain means reaching slaughter weight in the shortest time possible and, therefore, reducing the time it takes for the producer to obtain a return on investment.

However, quantity is no longer the only factor to be considered. Meat quality and rearing (and feeding) methods have become decisive criteria for consumers when choosing a product on the market. All of these have to take into account local laws and regulations, which in many cases limit and prohibit practices/products that may be deemed unethical.

Lean meat

The consumer considers the following aspects as swine meat quality indicators: appearance, colour, odour, taste, tenderness, fat quantity, etc.

Pigs store fat underneath the skin of the dorsal region. This fat deposition or backfat thickness expressed in millimeters is a differentiating criteria between lean and fatty meat. The market demands leaner carcases, with less backfat thickness.

Ractopamine, a β-adrenergic that inverts fat and muscle deposition rates in finishing pigs, was used for a long time in order to achieve this, obtaining a decrease in fat deposition in this phase and a greater nutrient availability for muscle development.

However, the use of this molecule is nowadays forbidden within the European market; which means the industry is currently looking for an alternative.

Choline metabolites

Monogastric diets are commonly supplemented with choline because it is an essential component of the phospholipid cell membrane, it is involved in liver metabolism preventing fat accumulation in the carcase, it is a precursor of acetylcholine, and it is crucial for a

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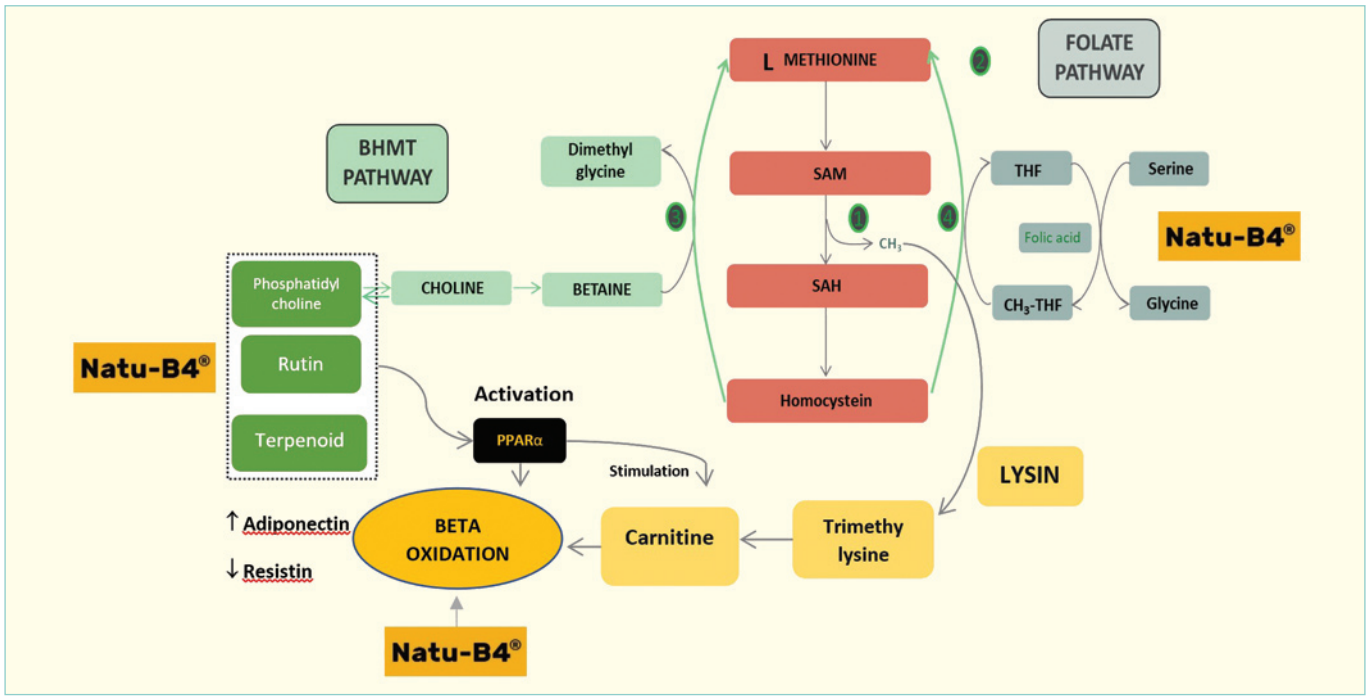
Fig. 1. Choline metabolism showing multiple sites of action of Natu-B4.



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balanced and functional methylation cycle.

A well-functioning methylation cycle processes methionine through adenylation into S-adenosyl-methionine (SAM), which is a methyl donor in over 50 different reactions, including DNA methylation, creatine synthesis, and phosphatidylcholine synthesis.

The methylation cycle also provides a source of phospholipids to be used for membrane structures, as well as important lipoproteins for fat metabolism (energy). Choline not only provides the choline fraction for phospholipid and lipoprotein synthesis, but it also participates in methionine regeneration, thus saving methionine for protein synthesis. Therefore, choline supplementation ultimately helps achieve an optimal fat and protein metabolism.

The suggested minimum choline level in pig diets is close to 300mg/kg, but there are certain conditions associated with raw materials, the animal's life stage, digestion, and metabolism that justify either its use or the use of its secondary metabolites in major densities.

Choline, when ingested, starts its metabolism into phosphatidyl-choline, the actual molecule responsible for the effects we know choline for. Phosphatidylcholine plays an emulsifying role and it activates cell receptors in order to mobilise fat.

Research has proven that Natu-B4 is more effective than choline chloride for attaining phosphatidyl-choline levels capable of carrying out functions attributed to choline.

One of the reasons Natu-B4 is capable of fully replacing choline chloride in much lower doses is that its phospholipid compounds (phosphatidylcholine and other phytoactive conjugated phospholipids) bind to peroxisome proliferator-activated receptors (PPAR), mainly liver PPARα (Fig. 1).

PPARα receptors are nuclear receptors with a directly proportional association with the adiponectin hormone production, meaning that the more PPARα receptors are activated, the more adiponectin is produced.

Adiponectin is an adipokine protein that participates in several metabolic functions, such as lipid and glucose metabolism, glucose utilisation, and lipogenesis.

In order for adiponectin to activate, it needs to bind to AdipoR1 and AdipoR2 receptors, which are expressed in insulin-sensitive tissues, such as skeletal muscle, liver, pancreas, and fatty tissue, where AMP-activated protein kinase's (AMPK) activity is increased, enabling fatty acid oxidation and glucose influx into the tissues.

Furthermore, adiponectin has a direct effect on the regulation of liver metabolic pathways, which enhances the use of nutrients and weight gain. It removes fat from storage areas (mainly the liver in birds and the back's subcutaneous tissue in pigs) and it plays a role in its catabolism and nutrient availability for the formation of other tissues.

The binding of adiponectin and its receptors increases AMP-activated protein kinase (AMPK) (AMPK) and peroxisome proliferator-activated receptor alpha's (PPAR-alpha) activity, enabling fatty acid oxidation and glucose influx into the tissues.

Therefore, the more activated receptors we have (animals exposed to Natu-B4 start activating their PPARα receptors at a younger age and when they become adults it has a greater fat-reducing effect), the more effect from adiponectin will be observed. The described mechanisms of action have been verified by HPLC analysis and metagenomic studies with the product Natu-B4, therefore they guarantee these effects only for this product.

Trials carried out in Europe and Latin America, both in research centres and commercial farms, have shown that Natu-B4 (in complete absence of choline chloride) improves productive indexes such as daily weight gain, feed conversion rate, and mortality, and reduces finishing-pigs' backfat thickness. They also showed that the sooner piglets receive this supplementation, the more evident its reducing effect becomes.

Finally, recent research shows that increasing the dose of Natu-B4 during the last four weeks of the pig's life enhances the backfat thickness reducing effect at slaughter, both in animals that do not consume ractopamine and those that do.

Conclusion

We can conclude that using Natu-B4 as the only source of functional choline metabolites in the pig's diet can be considered an alternative in order to achieve the backfat thickness reducing effect obtained with ractopamine, increase the daily weight gain, increase the carcase yield, reduce the feed conversion rate and mortality, with the additional advantage of not presenting any kind of risk or prohibition due to it being a 100% natural product. ■

References are available from the author on request