

TECHNOLOGICAL PROPERTIES:

- Hostazym® *suis* is marketed as microGranulated, homogeneous feed enzyme.
- The particle size gives the product an excellent free flowing ability and guarantees low-dust processing.
- The homogeneous distribution of Hostazym® *suis* microGranulate in the feed gives no risk of segregation.
- The product is stable during normal feed processes such as conditioning and pelleting.
- Proven stability in premixes and feed processing after pelleting conditions.
- The shelf-life is guaranteed up to 18 months after manufacture under normal storage.

REGISTRATION AND DOSAGE

Property	Hostazym® <i>suis</i> microGranulate
Production strain /origin	Trichoderma longibrachiatum (IMI SD 142), non genetically modified
Primary enzyme activity	Endo-1,4-β glucanase activity (EC 3.2.1.4)
Minimum activity	Hostazym <i>suis</i> 175 - 2000 CU/g Hostazym <i>suis</i> 70 - 5000 CU/g
Secondary activities	Xylanase, hemicellulase, α-amylase, protease
Minimum inclusion rate: CU/kg of feed	350 CU/kg of feed
Minimum inclusion rate g/ton of feed	Hostazym <i>suis</i> 175 - 175 g/ton of feed Hostazym <i>suis</i> 70- 70 g/ton of feed
Type of diet	Barley, wheat , triticale, rye, corn/soybean meal based
Target animals	Pigs until 14 week of age
Product form	Microgranulate
Package	25 kg bags
Shelf-life	18 months
Registration status	EU-approval with E. No 1616 for animal category "weaned piglets" up to 35 kg weight

- Hostazym® *suis* in pre-starter, weaner and grower feeds helps bridge serious post-weaning enzyme gap
- Hostazym® *suis* improves the efficacy of piglets' still immature endogenous enzyme production
- Hostazym® *suis* helps safeguard health and performance



UNIQUE MULTIENZYME COMPLEX FOR PIGS

Hostazym® *suis*

DIFFERENT BY NATURE

The main reasons for using enzymes in cereal based pig diets are to overcome the anti-nutritive effects of viscous non-starch polysaccharides (NSP) in grains: barley, wheat, triticale and rye. These substances can interfere with the 'normal' digestion, causing poor performance and digestive disorders. NSP-degrading enzymes are nowadays widely used and accepted in the diets for monogastric animals to resolve these problems.

Hostazym® *suis* is a natural, multi-enzyme complex with mainly endo-1,4-beta glucanase activity. This complex is produced through Solid State Fermentation process (SSF) using specific strain of Trichoderma longibrachiatum.

During the SSF process the fungal strain-producer excretes a multi complex of NSP degrading enzymes: endo-1, 4-β-glucanase, endo-1, 4-β-xylanase, endo-1, 3 (4)-β-glucanase, α-amylase, protease, α-galactosidase. The side enzymatic activities complement the main beta-glucanase activity and further enhance the degradation of NSPs present in the feed.





LIMITS OF ENDOENZYMATIC DIGESTION IN PIGLETS

The production pattern of endogenous digestive enzymes varies markedly, as pigs grow from piglets to the finisher stage or to breeding maturity. The reason is that the animal's dietary requirements change drastically over its lifespan.

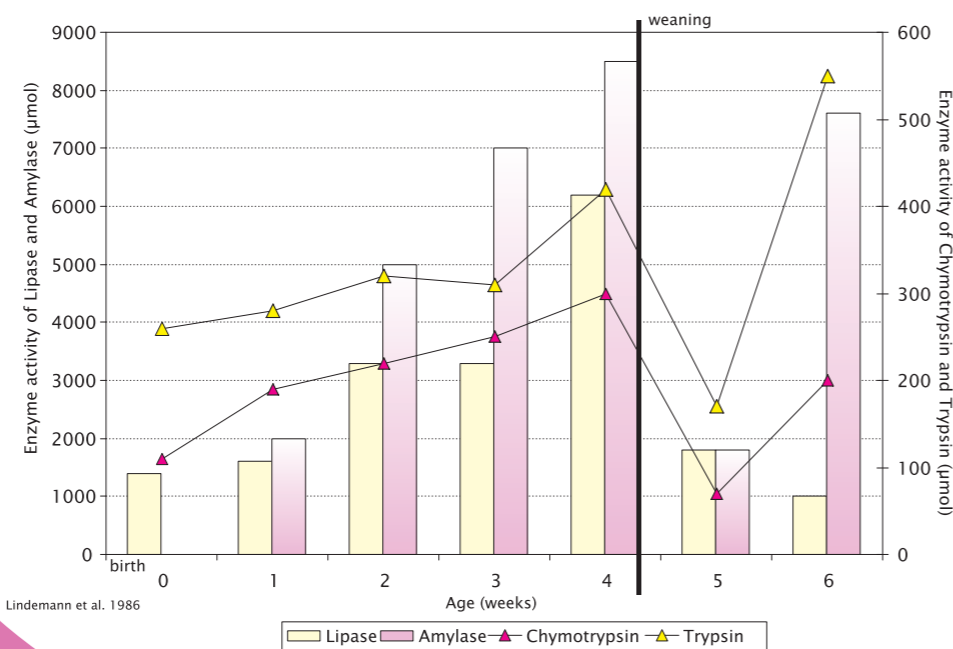
The metabolic change

After weaning piglets are subjected to an abrupt change in their diet from easily digestible milk, to which their endogenous enzyme production is adapted, to solid feed, which largely contains non-milk components. The piglet's enzymes production pattern is not fully prepared for the sudden change and during the following weeks dietary based digestive disorders frequently occur.

Additional consequences

Adding to the problem piglets may also be experiencing negative effects from other post-weaning stresses. Transportation, a sub-optimal rearing environment, adjustments in new herds and greater risk of infection, all of which can destabilize the animal's fragile intestinal flora and digestive physiology. The initial adaptation of the animal endogenous enzyme production to non-milk nutrition may suffer a setback of several days, which can easily lead to a serious enzyme gap.

Enzymes activity before and after weaning piglets



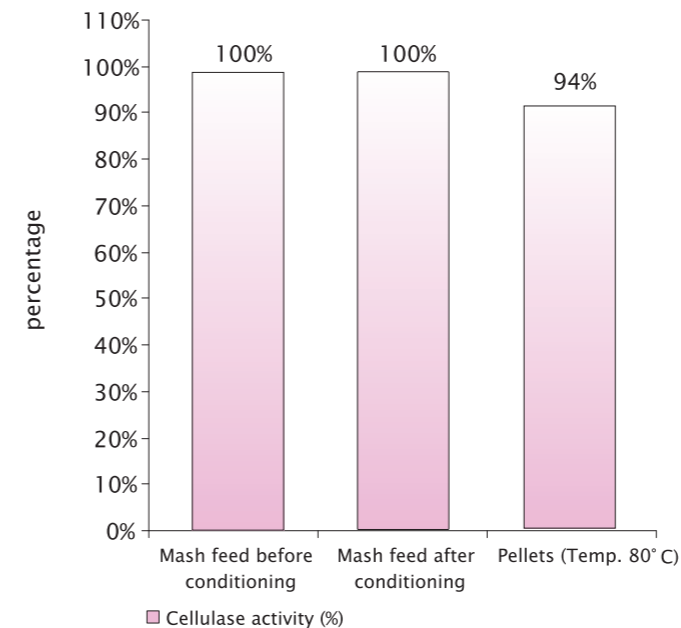
Lindemann et al. 1986

Lack of endogenous pancreatic enzymes in post weaning piglets
(measured in μmol substrate hydrolyzed or produced per g of pancreatic tissue in 1 minute)

Hostazym® suis - heat stability

1. Trial site: IFF, Braunschweig
2. Conditions: conditioning with 3% dry steam for 40 sec.
3. Results:

Pelleting Stability of Hostazym® suis



CONCLUSIONS: Hostazym® suis retains 94% of its enzyme activity even when subjected to Pelleting temperature of 80°C.

Hostazym® suis benefits in diets for pigs:

- Upgraded nutritional value of diets containing high NSP cereals.
- More flexibility in least-cost diet formulation.
- Consistent feed quality irrespective of cereal NSP content fluctuations.
- Improved daily body weight gain and feed conversion efficiency.
- Improved uniformity of growth during the rearing and fattening stages.
- Reduced risk of dietary digestive disorders after a change in feed ingredients.
- Reduction in nitrogen and phosphorus excretion.
- Different by nature SSF.
- Multi enzyme complex to support endoenzymes

TRIAL 3

Effect of dietary supplementation with Hostazym® *suis* for weaned piglets on the apparent digestibility of dry matter, crude protein and energy:

1. Trial site: Università degli Studi di Milano, Dipartimento di Scienze e Tecnologie Veterinarie per la Sicurezza Alimentare.
2. (Large White x Landrace) x Duroc piglets, 7,6 kg avg body weight, 168 piglets, 2 treatments.
3. Test substance: Hostazym® *suis* at 350 CU/kg of feed (175 g/ton).
4. Feed composition: barley, corn, soybean meal.
5. Digestibility trial set-up: Faecal samples collected at days 0,7,14, 21 and 28 of the experimental period for determination of Dry matter, Organic Matter, Crude fiber, NDF ash and Gross Energy.

RESULTS

Diets	Dry Matter	Organic Matter	Crude Protein	NDF	Gross Energy
Control, (%)	86.7b	88.0b	86.7b	67.0b	86.4b
Control + Hostazym <i>suis</i> , (%)	87.1a	88.4a	87.0a	68.7a	87.0a

differing subscripts indicate a significant difference at $P < 0.01$

COMPLEMENTARY ACTIVITY

Hostazym® *suis* offers a well-balanced combination of enzyme activities, having high affinity towards the highly branched arabinoxylans present in vegetable protein sources such as soybean meal. This further improves its overall efficacy when used as additive in pig diets.

Addition of enzymes to pig diets makes it possible to include high levels of cost-benefit cereals, ingredients which otherwise would not be optimally digested.

Hostazym® *suis* helps to reduce feed costs and results in excellent animal performance.



DIGESTIVE ENZYMES AND THEIR IMPORTANCE IN PIGS

Pig feed contains many complex molecules, which the intestinal tract cannot always absorb. Within the carbohydrate group, starch is the most important component, an easily digestible source of energy for pigs. In addition to starch, cereals contain other carbohydrates; celluloses, hemicelluloses and pectin, which are difficult to digest and can have detrimental effects on the digestion and absorption of nutrients. They are classified as Non-Starch Polysaccharides (NSP).

MODE OF ACTION

NSPs are usually associated with the cell wall and exert their effect in several ways by limiting the availability of nutrients for digestion in the gastrointestinal tract of monogastric animals:

- NSPs can be resistant to endo-enzymatic digestion and therefore obstruct the digestion of other valuable dietary components; this is known as “the cage effect”
- When NSPs are in solution, they produce a viscous digesta which interferes with 'normal' digestive processes and gut microflora, additionally increase the water-holding capacity of digesta which directly influences the rate of passage of digesta

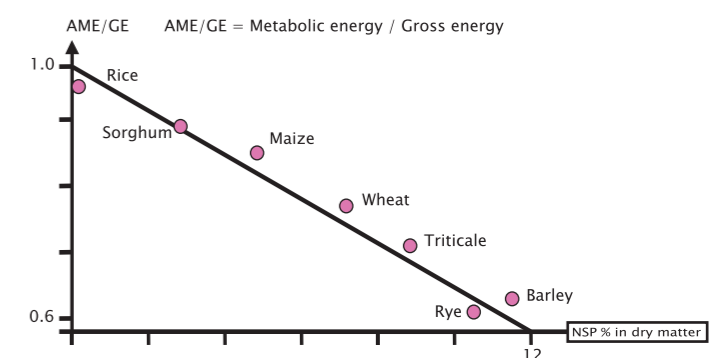
The close relation between the NSP content of cereals and their nutritional value is reflected in the amount of Metabolisable Energy that pigs can extract from these cereals. This relationship is shown in figure 1 (see below).

Two NSPs play an important role in pig diets:

- β -glucans: present in barley and oats
- Arabinoxylans (pentosans): present in wheat, rye and triticale

BODY WEIGHT GAIN AND FEED EFFICIENCY

Hostazym® *suis* improves both weight gain and feed conversion. Based on a large number of studies, a typical improvement of 3.6% in daily weight gain and 3.2% in feed conversion efficiency are observed. In individual studies, improvements of up to 10% in daily weight gain and 7.5% in feed conversion have been reached.



ENDOGENOUS DIGESTIVE ENZYMES AND THEIR EFFECT DURING FEED PASSAGE IN PIGS

Organ which synthesizes digestive enzymes	Name of enzyme	Macro-molecule (nutrient)	End product of enzymatic reaction
Salivary gland	α -amylase	Starch	Maltose
Stomach mucosa	Pepsin	Proteins	Polypeptides
Pancreas	α -amylase	Starch	Maltose
	Trypsin, chymotrypsin	Proteins, polypeptides	Oligopeptides
	Carboxypeptidases	Polypeptides, oligopeptides	Amino acids
	Lipase	Fats	Fatty acids, glycerol
Small intestinal mucosa	Maltase	Maltose	Glucose
	Lactase	Lactose	Glucose, galactose
	Aminopeptidases	Oligopeptides	Amino acids

Hostazym® *suis* - practical results in pig diets

TRIAL 1

1. Trial site: Experimental Animal Farm, Szent Istvan University, Hungary
2. Large White x Landrace weaned piglets, females and castrated males 1:1, 50 animals, 2 treatments and 5 groups each, **weighing between 7 and 9 kg and 28-32 days old**
3. Test substance: Hostazym® *suis* at 350 CU/kg of feed (175 g/ton)
4. Feed composition: barley (48.26%), corn (20%), soybean meal (16.5%) , full fat soya 5% with the following analyse Crude protein 18% and 13.0 MJ ME/kg

RESULTS

Body weight:

Body weight, kg	Control	Hostazym® <i>suis</i>
Day 42 (after weaning)	34.70 100 %	36.29 104.6%

Body weight gain:

AGD g/day	Control	Hostazym® <i>suis</i>	P-Value
4-42 day (after weaning)	661.37 100 %	703.68 106.4%	0.02

Feed efficiency (feed/body weight gain)

Feed conversion ratio	Control	Hostazym® <i>suis</i>	P-Value
Day 0 - 42 (after weaning)	1.815 100%	1.751 96.47%	0.06

CONCLUSIONS:

Overall: 42 days period

The feed containing Hostazym® *suis* gives an improved body weight gain of 4.6% compared to the control. Addition of Hostazym® *suis* improves the feed efficiency by 3.53% and daily weight gain by 6.4%. Next to these zootechnical parameters, it was found that the digestibility of nutrients especially crude fiber, dry matter, organic matter and crude fat was increased.

Hostazym® *suis* is an excellent enzyme for piglets, fed diets which include cereals like barley, wheat, rye, triticale and soya.

TRIAL 2

1. Trial site: Centrum voor Agrarisch Praktijkonderzoek (CAPO) / Belgium
2. Animals: Euribrid x Piètrain, **22.5 kg avg body weight**, 40 animals per treatment; 2 treatments
3. Test substance: Hostazym® *suis*
4. Grower composition: wheat-50%, barley-15%, soybean meal 21, 5%

RESULTS

Body weight

Body weight, kg	Control	Hostazym® <i>suis</i>
Day 0	22.5 kg	22.8 kg
Day 34	41.20 100 %	41.9 101.7%

Body weight gain:

AGD g/day	Control	Hostazym® <i>suis</i>
	548.00 ^a 100 %	563.00 ^b 102.7%

Feed efficiency (feed/body weight gain)

Feed conversion ratio	Control	Hostazym® <i>suis</i>
Day 0 - 34	2.31 100%	2.22 96.1%

CONCLUSIONS:

In a grower diet, with a body weight ranging between 22,5 and 41,9 kg, the supplementation of Hostazym® *suis* to a diet based on wheat (50 %), soya bean meal (21,5 %) and barley (15 %) has the following advantages:

1. Daily weight gain: + 15 g (+ 2.7 %) from 548 g to 563 g (significant differences)
2. Feed efficiency: - 3.9 % - from 2.31 to 2.22
3. Based on the assumption of 1.000 tons grower feed, a surplus of 17.530 kg (+ 4 %) live weight can be produced during the grower period of 34 days

Due to its many side enzymatic activities Hostazym® *suis* offers flexibility in supplementation of diets based on different cereals.

