PeterLabs BULLETIN

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The Performance of Swine Breeding Herds in Malaysia during 2013

Dr. Paiboon Sungnak, D.V.M.
InterCons 3P Co., LTD., Thailand

Since 2009 swine consulting veterinarians from Thailand, aggregated under the name of InterCons 3P, in collaboration with PeterLabs has introduced a new computerized recording system known as PigLIVE, to pig producers in Malaysia. The system was constructed by Prof. Dr. Preeyaphan Udomprasert from Kasetsart University in Thailand and has been used as a standard record keeping system for majority of Thai producers for years. Once data recording is completed, PigLIVE will not only demonstrate actual performance to Malaysian producers but also allow them to effectively dispatch factors limiting farm productivity. Nowadays more than 60 medium to large farms in Malaysia are using PigLIVE for their production controls. The aim of this article is to compare production figures of pig farms in Malaysia between year 2012 and 2013 (Table 1). Malaysian figures were 12 month-rolling averages summarized from 29 units (23,000 sows in total).

Table 1. Production figure of swine breeding herd in Malaysia during 2012 compared to 2013

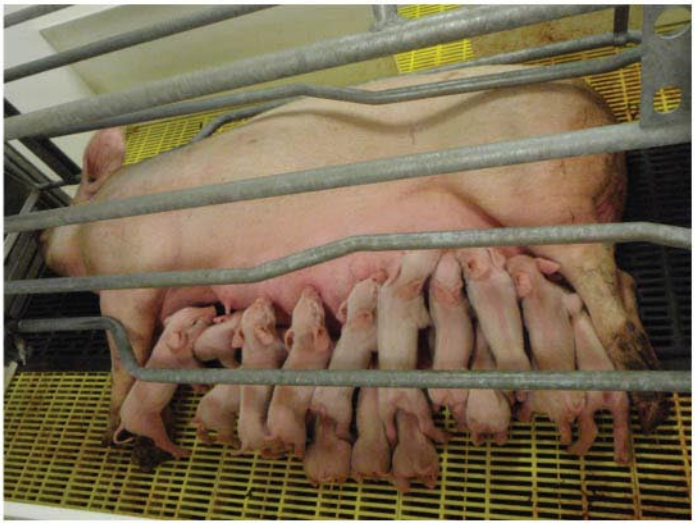
Breeding Performance	Unit	Average 2012	Average 2013	TOP 5 Farms 2012	TOP 5 Farms 2013
Repeat Service	%	17.7	15.0	11.0	6.5
Weaning-1st Service Interval	Days	8.9	7.8	6.4	5.8
Sows Bred by 7 Days	%	82.7	84.7	91.6	90.7
Avg. Parity of Farrowed Sows	Parity	3.9	3.8	3.8	3.1
Average Pigs / Litter	Pigs	10.6	10.8	11.1	12.0
Average Pigs Born Alive / Litter	Pigs	10.0	10.2	10.5	10.9
Still Born Pigs	%	5.0	5.3	5.0	0.9
Mummies	%	0.8	1.0	1.2	-
Farrowing Rate	%	73.7	77.4	83.5	85.8
Litters / Mated Female / Year	Litters	2.0	2.2	2.3	2.4
Avg. Pigs Weaned / Litter	Pigs	9.3	9.6	10.3	10.4
Pre-Weaning Mortality	%	8.8	7.6	7.2	2.4
Avg. Weaning Weight	kg	NA	7.2	7.7	8.6
Avg. Lactating Length	Days	26.1	27.7	23.3	30.4
Pig Weaned/Mated Famale/Year	Pigs	18.6	20.2	22.8	23.5
Average Parity	Parity	3.0	2.9	2.3	2.3
Replacement	%	48.8	46.4	41.5	62.3
Culling Rate	%	35.4	38.6	27.4	58.1
Avg. Parity Of Culled Sows	Parity	5.1	4.9	6.0	6.9
Sow Death	%	11.5	6.6	2.4	1.9

Top 5 farms production figure highlights

- This report shows that the number of **Pig Weaned/Sow/Year (PSY)** has improved from **22.8 to 23.5** (increases 0.7 pigs/sow/year) in 2012 and 2013 respectively. In addition, they are potential pig producers who can produce **25 pigs weaned/sow/year**.
- **Litter/Sow/Year (LSY)** has improved from **2.3 to 2.4** in 2012 and 2013 respectively.
- The number of **Weaned Pigs/Litter (WP/L)** has improved from **10.3** in 2012 to **10.4 weaned pigs/litter** in 2013.

Guidelines to improve number of Pig Weand/Sow/Year (PSY)

- Breeding group size (BGS) must be calculated properly base on the number of sows and the number of farrowing crates.
    - o Number of sows should be mated/month = number of sows x 0.25
- Ensure that replacement gilts will be managed properly ie. Estrous cycle recording, vaccination program, medication program, acclimatization, flushing and boar exposure.
    - o The recommendation of gilt body weight at mating time is 140-150 kg at 8.5 months old
- Ensure that mating procedure is performed well according to the mating guidelines which were published in PeterLabs bulletin, 2nd and 3rd issues in 2012.
- Ensure that diluted semen is high fertility such as high progressive motility sperm, less clumping sperm.
- Gestating sows always stay under cool condition until farrowing.
    - o Fans must be installed in area for pregnant sows to improve the ventilation.
- Treating sick sows during pregnancy period is recommended.
    - o Use antibiotics (amoxicillin, cedtiofur) and non-steroid anti-inflammatory drug, NSIAD (Flunixin).
- Maximize lactation feed intake is strongly recommended for better farrowing rate and subsequent litter size.
    - o 5.5-6.0 kg/day, 3 meals a day.
    - o Adding antibiotics (Tiamulin, Amoxicillin and Colistin) in lactation feed is strongly recommended.
- Toxin binder and toxin deactivated products must be added in gestation and lactation diets all the time.
- Drinking water for sows and pigs must be treated by using chlorine to minimize bacterial contaminations.



For more information please contact with PeterLabs.

NOVUS INTERNATIONAL, INC.

Mintrex® - The Value of Chelated Trace Mineral

Zinc (Zn), copper (Cu), manganese (Mn) and other essential trace elements play an important role in the physiological development and the health of animals. Therefore, trace elements are added in almost all of the animal feed.

Dietary organic trace minerals can be more effective in providing mineral elements for the body, and improvement in animal production, e.g. involves in antioxidation and DNA repair processes, improves immunity, increases bone and tissue strength and relieves oxidative stress. High bioavailability of organic trace minerals tends to reduce the amount of added minerals in the feed and also to decrease environmental pollution.

Currently, the challenges faced by nutritionists are to screen out the highest bioavailability trace minerals to be applied in animal production. Novus research team believes that the bioavailability of trace mineral and chelation is closely related. The degree of mineral chelation can be tested in the laboratory, but in the field, the best way to evaluate the effectiveness of chelated minerals by the improvements of zootechnical performance and health status of the livestock.

Action of Chelation

Chelation is a binding process of a metal ion (minerals) and a ligand substance (enzyme, protein or amino acid) resulting to mineral or organic compound that we usually address as "chelate."

In Mintrex® products, the organic ligand substance is HMTBa (2-hydroxy-4-methylthio butanoic acid, it is also an active ingredient in MHA).

Research confirmed that the stability of trace element chelation in Mintrex® under low pH conditions (upper gastrointestinal tract) was significantly higher than similar products, this is to ensure that animals can effectively absorb more trace elements into their body.

Mintrex® not only providing organic trace elements, but also supplying methionine with high added value which has the following features:

- Improves production, carcass and meat production
- Increases immunity
- Maintains the health and integrity of bone and joint
- Increases bone, skin strength and flock uniformity
- Maintains the health of foot pad
- Reduces minerals excretion to the environment

Once trace elements transported to the site of absorption, Mintrex® ligand (HMTBa) can be converted to L- methionine.

Improves the health status of foot pad

Poultry foot pad lesion will reduce the economic value of chicken feet in the market. Novus research team found that feeding the correct and proper diet can reduce the incidence of poultry foot pad lesion.

A trial conducted by Novus in Brazil showed that, for the control group, there are more than 50 % of foot pad lesion score of 1 or higher; whereas for Mintrex® supplemented group, only 25 % of the foot pad lesion score is of 0 or higher. Thus, adding Mintrex® in animal diets can reduce at least 2 times the incidence of foot pad inflammation.

Mintrex® can increase foot pad quality of animals

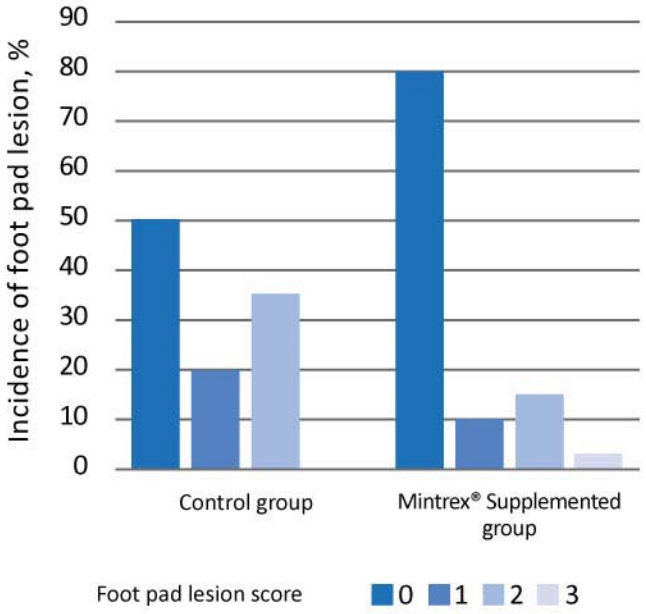


Figure 1: Effects of Mintrex® on animals' foot pad

Foot pad lesion score

0: Foot pad in ideal condition, no lesion;
1: Slight lesion, reddish foot pad, painful;
2: With small wound, foot pad adhered with excreta;
3: Severe lesion, adhered with lots of excreta, deep wounds, bleeding damaged toes. Foot pad is in pale brownish colour.

Improves egg shell quality

Maintaining the balance of minerals can improve the internal structure of egg shell and the integrity of unhatched chicks. Meanwhile, as the age of the hens increases, dietary minerals is more important to maintain high quality egg production and improve the overall welfare of laying hens.

A trial comparing the effects of Mintrex® on egg quality showed that Mintrex® can improve the egg shell quality of old laying hens and increase egg weight.

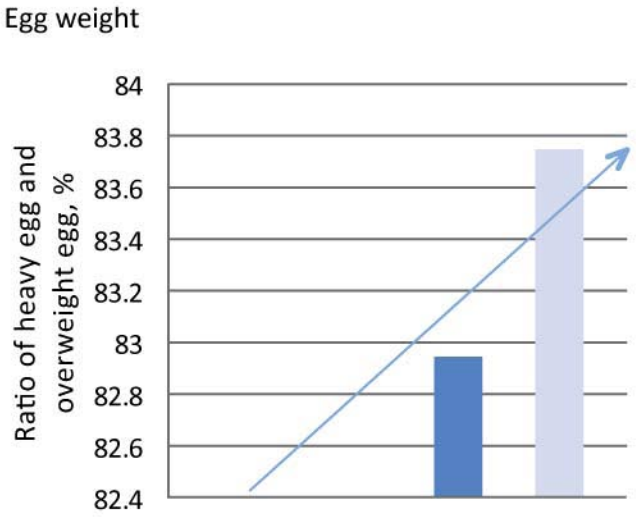


Figure 2: Effects of Mintrex® on egg weight

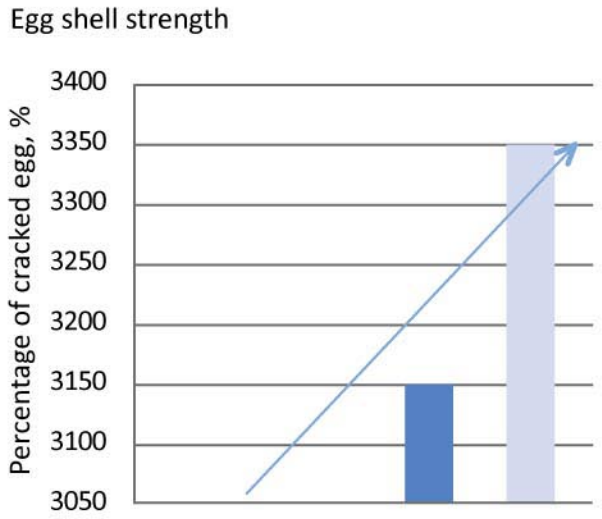


Figure 3: Effects of Mintrex® on egg shell strength

Mintrex® can improve egg shell quality of old layers (51-week old)

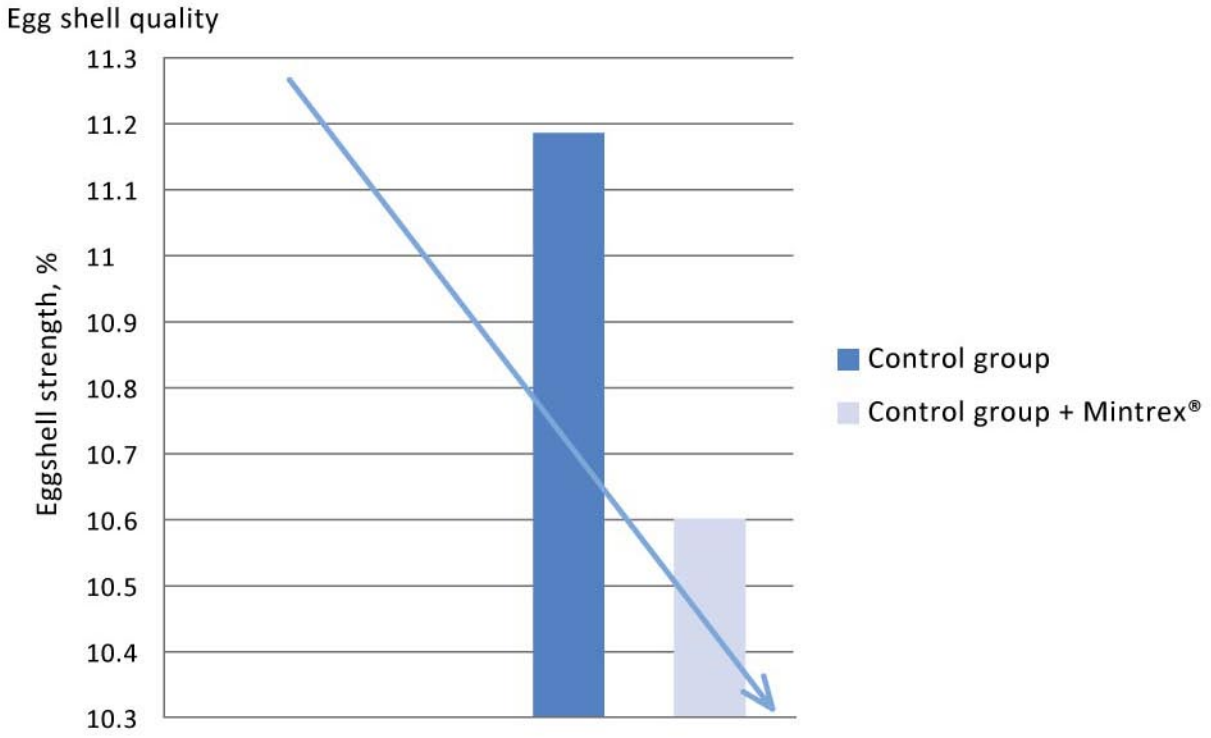


Figure 4: Effects of Mintrex® on egg shell quality

Smaller amount, greater efficiency

The advantage of Mintrex® is to provide the necessary trace minerals for poultry, and also to supply the required methionine. The efficiency of Mintrex® transport mechanism can improve the health status of poultry, increase productivity, and ultimately increasing producers' economic benefits.

Conclusion

Feeding high-quality, high bioavailability trace elements is the key factor in maximizing growth potential and animal health. Chelated trace elements have the potential for more effective transportation of elements to animal body tissue and enhancing animal cells and tissues biochemical reaction process. These have widely strengthen the physiological function and growth performance of animals.

ZEUS®

Homeostasis of Probiotics

All animals including poultry have some microflora in their gut, which grow, multiply and colonize. There are temporary ones too, they also grow and multiply but do not colonize. They stay for some time and passes out but their effects are pronounced as they pass through the intestine. In both groups some are useful: Lactobacillus, Bacillus and yeast whereas, others are harmful: E. coli, Salmonella, Clostridia and Campylobacter. Healthy animals draw balancing actions between useful and harmful organisms. When this balance is disturbed, harmful ones take upper hand to cause discomfort or disease. On the other hand, when useful organisms take upper hand, the general health improved. We have introduced selected heat-resistant spore-forming bacillus species which can significantly reduce Salmonella and Clostridium when administered in high numbers.

Probiotics are of two types

1. Vegetative reproducing type : e.g. *Lactobacillus lactis, Lactobacillus casei, Lactobacillus plantarum, Lactobacillus delbrueckii spp bulgaricus, Lactobacillus rhamanosus, Enterococcus faecium, Bifidobacterium bifidum, Pediococcus acidilacti, Streptococcus salivaris spp thermophilus* and *Streptococcus diactilacticus*. Vegetative reproducing bacteria are not good for competting with pathogenic bacteria because they take long time to multiply and are required in large numbers to establish in the gut. Also, they are sensitive to heat and pressure.

2. Spore forming type (consittuent of **Microguard™**) : e.g. *Bacillus subtilis, Bacillus toyoyi, Lactobacillus sporogenes, Bacillus licheniformis, Bacillus megaterium, Bacillus polymyxa* and *Bacillus mesentricus*.

Bacillus subtilis is found beneficial when fed to animals and poultry. Counts of harmful bacteria decreased considerably, while useful bacteria increased. Bacillus spores are capable of germinating within 30-60 minutes of ingestion in the chicken intestine (Hoa *et al.,* 2000; Casula and Cutting, 2002).

Bacillus subtilis secretes a group of peptides called surfactins. These surfactins damage cell membrane of the bacteria to kill them. *B. subtilis* also produces bacitracin which interferes with the proliferation of *C. perfringenes* (bacteriostatic). Others produce certain antibiotics such as acidolin and acidophylin.

Some of the probiotic bacteria also produce organic acids to reduce pH of intestine and suppress development of coliforms (harmful bacteria).

Any bacteria when it enters the gut would normally try to find a receptor and then bind to it. The receptors here are mannose producing lectins (adhesins) present on finger like structures (villi) of the intestine. The bacteria first try to attach to these receptors and then begin to multiply. Probiotic bacteria compete with the harmful bacteria for these sites or receptors and succeed in occupying majority of the receptors when included regularly in feed or water. This is how the harmful bacteria such as E.coli, Salmonella, Clostridia, Campylobacter and Vibrio are excluded from the gut. Probiotics also compete with pathogens for nutrients and improve local (intestinal) immunity as well.

Microguard™ composition :

(Number of spores per kg in billion)

- *Lactobacillus sporogenes* : 2000
- *B. subtilis* : 1000
- *B. licheniformis* : 500
- *B. megaterium* : 500
- *B. mesentricus* : 500
- *B. polymyxa* : 500

Fortified with *Saccharomyces boulardii*

Total viable count : 5000 Billion (5×10^{12})

Microguard™ - Administration

In poultry,

Through Drinking Water

Chicks	: 20 g/1000 birds daily
Growers & layers	: 20 g/1000 birds daily
Breeders & broilers	: 10 g/1000 birds daily

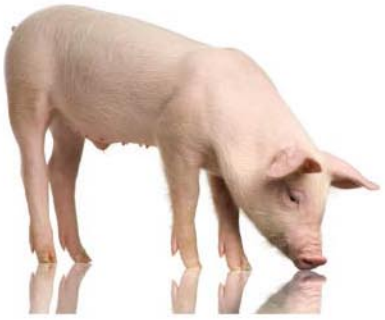
Through Feed

Broilers/Layers	: 100 g/ton
Breeders	: 100-500 g/ton

Spraying

Shed, cages, litter, water tank and other equipment: 100 g/5 L of water for every 5,000 sq. ft. one day earlier to arrival of chicks.

Chicks : 100 g/2 L of water for 5,000 chicks immediately on hatching or on arrival at the farm.



In swine,

Piglets	: 1 g per 5 piglets (up to 10 days old)
	2 g per 5 piglets (up to 30 days old)
Starters	: 100 g/ton
Growers	: 50 g/ton
Finishers	: 50 g/ton
Sows	: 100 g/ton

Average length of villi

With **Microguard™**

1.68µm

Without **Microguard™**

1.42µm

Source: Dr. Maxmillan Anderson, 2011, Larrybeth Farm, Philippines.

Dosage (through drinking water): 20 g/1000 birds from day 1-5 and thereafter 10 g/1000 birds till day 35.

Table 1. Effects of Microguard™ on the body weight of piglets

Parameters	Control	Microguard™
Birth weight (kg)	1.30	1.31
Avg. weight at 21 days (kg)	4.69	5.01
Avg. weight at 60 days (kg)	18.95	22.55
FCR	1.61	1.39
Extra weight at 60 days	-	+3.6 kg

Dosage: 1 g/head up from day 1-30 and 50 g/ton from day 31- 60.
Source: Dr. Anantha Moorthy and Dr. Joseph George, Pig Breeding Farm, Kolazhy, Kerala.

Table 2. Effects of Microguard™ on the growth performance of piglets

Parameters	Control	Microguard™	Difference
No. of piglets	200	200	-
Feed Intake (g/day)	748	763	+2.00%
Avg. daily weight gain (g/day)	475	515	+8.42%
FCR	1.57	1.48	-5.73%

Dosage: 100 g/ton in maize-soy diet.
Source: Dr. Anantha Moorthy and Dr. Joseph George, Pig Breeding Farm, Kolazhy, Kerala.

PeterLabs 简报

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2013 年马来西亚种猪性能

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自2009年以来，泰国的养猪咨询兽医，成立了InterCons 3P 并与PeterLabs合作，为马来西亚的养猪户推出了新的电脑化记录系统，简称为PigLIVE。该系统经由泰国Kasetsart大学的Preeyaphan Udomprasert教授建造，并已在多年以来被大部分的泰国养猪户普遍地使用为一个标准的记录保存系统。当数据记录完成后，PigLIVE不仅将实际的表现呈现于马来西亚的生产者，也使他们能够有效地为控制生产力的因素作出适当的调整。目前，在马来西亚，超过60家中，大型的农场使用PigLIVE以监控生产能力。本报告的目的在于比较马来西亚与泰国的养猪场介于2012和2013年的生产值（表一）。马来西亚的数值分别为29个农场12个月内的平均值（总共23,000头母猪）。

表一、与2012年相比，2013年马来西亚种猪生产数值

生产性能	单位	平均 2012	平均 2013	2012前5名农场	2013前5名农场
重发情	%	17.7	15.0	11.0	6.5
离乳至第一次发情的间距	日	8.9	7.8	6.4	5.8
在7天内配种的母猪	%	82.7	84.7	91.6	90.7
分娩母猪之平均胎数	胎	3.9	3.8	3.8	3.1
平均仔猪/胎	只	10.6	10.8	11.1	12.0
平均活仔猪/胎	只	10.0	10.2	10.5	10.9
死胎	%	5.0	5.3	5.0	0.9
黑胎	%	0.8	1.0	1.2	-
分娩率	%	73.7	77.4	83.5	85.8
胎数/配种母猪/年	胎	2.0	2.2	2.3	2.4
平均离乳仔猪/胎	只	9.3	9.6	10.3	10.4
离乳前死亡率	%	8.8	7.6	7.2	2.4
平均离乳体重	公斤	NA	7.2	7.7	8.6
平均哺乳期	日	26.1	27.7	23.3	30.4
离乳头数/配种母猪/年	只	18.6	20.2	22.8	23.5
平均胎数	胎	3.0	2.9	2.3	2.3
替换率	%	48.8	46.4	41.5	62.3
淘汰率	%	35.4	38.6	27.4	58.1
平均淘汰母猪之胎数	胎	5.1	4.9	6.0	6.9
母猪死亡率	%	11.5	6.6	2.4	1.9

前5名农场之数值

- 本报告显示离乳头数/母猪/年 (PW/S/Y)从2012年的22.8头提高至2013年的23.5头（增加0.7头/母猪/年）。除此之外，也有猪农能够生产25头离乳头数/母猪/年（PW/S/Y）。
- 胎数/母猪/年 (LSY) 从2012年的2.3胎提高至2013年的2.4胎。
- 离乳仔猪头数/胎 (WP/L) 已经改善，从10.3头离乳仔猪（2012年）增加至10.4头离乳仔猪（2013年）。

加强离乳头数/母猪/年的方针

- 育种猪群的数量 (BGS) 必须配合母猪每个月的分娩头数和分娩栏数精准地计算。
    - o 交配的母猪数量/月 = 母猪数量 x 0.25
- 确保后备女猪的管理恰当，如记录发情周期、疫苗接种程序、用药程序、适应期、催卵期和公猪的接触。
    - o 建议使用8.5月龄的后备女猪交配，体重介于140-150公斤
- 确保配种程序正确，配种程序方针可参考PeterLabs 2012年第2和第3期期刊。
- 确保稀释后的精液有高生育率，即精子活力高，凝集成群的精子少。
- 怀孕母猪置放于阴凉处，直到分娩。
    - o 在怀孕母猪栏安装风扇，以改善通风。
- 建议治疗怀孕中的生病母猪。
    - o 使用抗生素(amoxicillin, ceftiofur) 和非甾体抗炎药
- 强烈推荐提高哺乳期间母猪的摄食量以提高分娩率和随后的产仔数。
    - o 5.5-6.0 公斤/天，一天三餐。
    - o 建议在哺乳期料里加入抗生素（泰妙菌素Tiamulin、阿莫西林Amoxicillin和粘菌素Colistin）。
- 怀孕母猪和哺乳饲料必需加入霉菌吸附剂和解除活化毒素产品。
- 母猪和仔猪的饮用水必须加入氯 (chlorine)，以减少细菌的污染。

欲了解更多的信息，请联系PeterLabs。

NOVUS INTERNATIONAL, INC.

明微物® (Mintrex®) - 螯合微量矿物质的价值

锌(Zn)、铜 (Cu)、锰 (Mn) 等必需微量元素在动物的发育和健康上有着重要的生理生化作用。微量元素营养在畜牧学中的重要性不言而喻，几乎所有的动物饲料都会添加微量元素。

日粮中添加有机微量矿物质可以更有效地为机体提供矿物质元素,从而为动物生产带来一系列促进效果，例如参与机体的抗氧化过程和DNA修复、提高免疫力、增加骨骼与组织强度和缓解氧化应激等。有机微量矿物质的高生物效价还意味着可以在饲料中减少矿物质的添加量, 减少畜牧生产对环境的污染。

目前, 营养师所面临的挑战是尽快筛选出生物利用率最高的微量矿物质应用于动物生产。诺伟司(Novus)研究团队认为，微量矿物质的生物利用率与矿物质的螯合状态存在密切联系。矿物质的螯合程度可在实验室测定，但是在现场，评估螯合矿物质有效性的最佳方法是观察家畜的生产性能和健康状态是否得到改善。

螯合作用

螯合是指一个金属离子（矿物元素）与一个配体物质（酶类、蛋白质或氨基酸）结合的过程，生成的矿物质或有机物复合物就是我们通常说的“螯合物”。

在明微矿® (Mintrex®) 产品中的有机配体物质是HMTBa（蛋氨酸羟基类似物，同时它也是MHA里的活性成分。

研究证实明微矿® (Mintrex®) 微量元素螯合物在较低pH条件下（消化道前段）的稳定性显著高于同类产品，保证动物可以有效吸收更多的微量元素。

明微矿® (Mintrex®) 不仅提供有机微量元素，还同时提供蛋氨酸(methionine)，附加值高，具有以下功能:

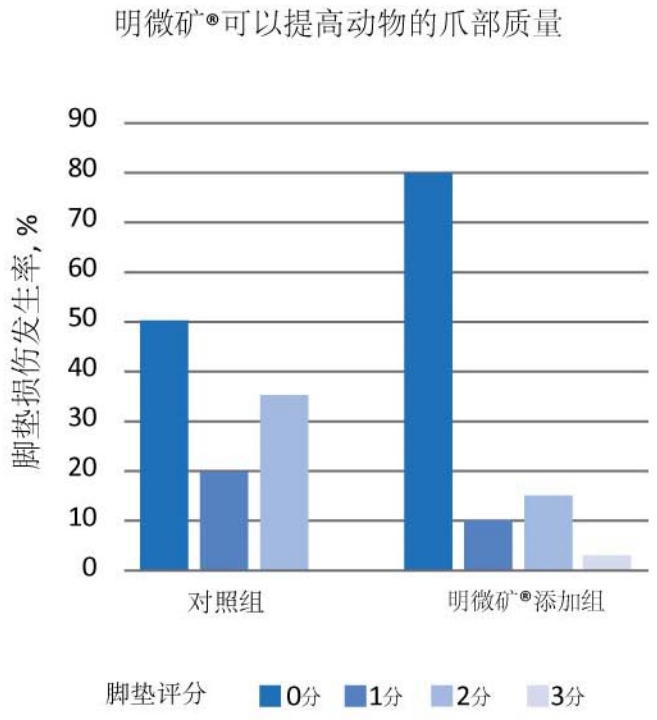
- 改善生产性能、胴体率和产肉率
- 提高免疫性能
- 维持骨骼和关节的健康和完整
- 提高家禽的骨骼皮肤强度和一致性
- 维持脚垫健康
- 降低对环境排放的矿物质

把微量元素运送到吸收位点后，明微矿® (Mintrex®) 中的配体蛋氨酸羟基类似物 (HMTBa)可被转变为L-蛋氨酸 (L-methionine)。

提高脚垫的健康状态

家禽脚垫的损伤会降低鸡爪在市场中的经济效益。诺伟司 (Novus) 团队研究发现,饲喂正确且合适的日粮可降低家禽脚垫损伤的发生率。

诺伟司(Novus)在巴西进行的试验结果显示，在对照组中，有超过50%的家禽其脚垫损伤评分为1分或者更高；而在明微矿® (Mintrex®)添加组中，只有 25% 的家禽爪部损伤评分在0分以上。因此，在动物日粮中添加明微矿®可降低爪部皮肤炎的发生率至少 2 倍。



图一：明微矿® (Mintrex®) 对动物爪部的影响

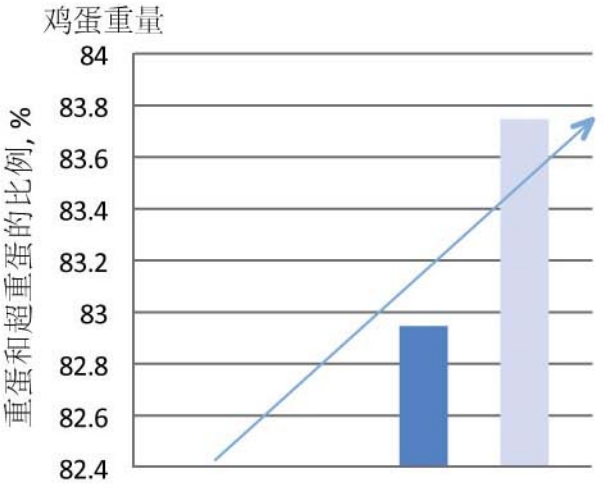
脚垫评分

0 分：脚垫处于理想状态, 无损伤；
1 分：轻微受损, 脚垫变色, 微红, 疼痛；
2 分：有小伤口, 点状。脚垫粘有排泄物；
3 分: 脚垫严重受损, 粘有大量排泄物,伤口较深，趾间出血且受损。脚垫呈赭色。

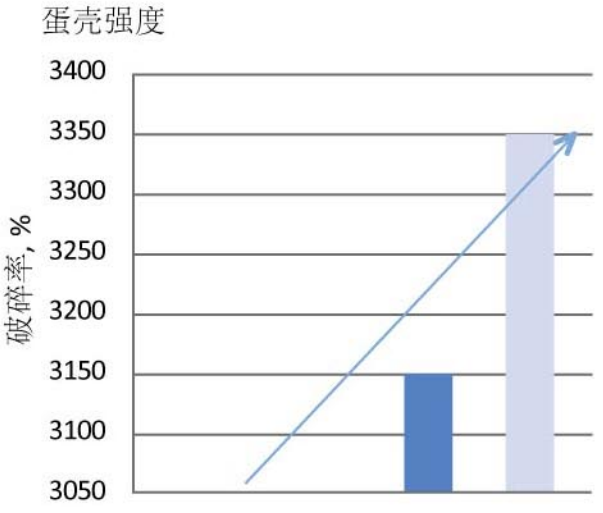
提高蛋壳质量

维持矿物质的平衡可以提高蛋壳质量、改善鸡蛋的内部结构和未孵化雏鸡的组织完整性。同时，随着母鸡日龄的增加，日粮中矿物质营养对确保持续高质量的产蛋和提高母鸡整体的福利具有更加重要的作用。

试验比较正常日粮和添加明微矿®(Mintrex®)日粮对鸡蛋质量的影响，结果显示明微矿®可提高产蛋后期的蛋壳质量，同时在不降低蛋壳强度的基础上增加鸡蛋的重量。

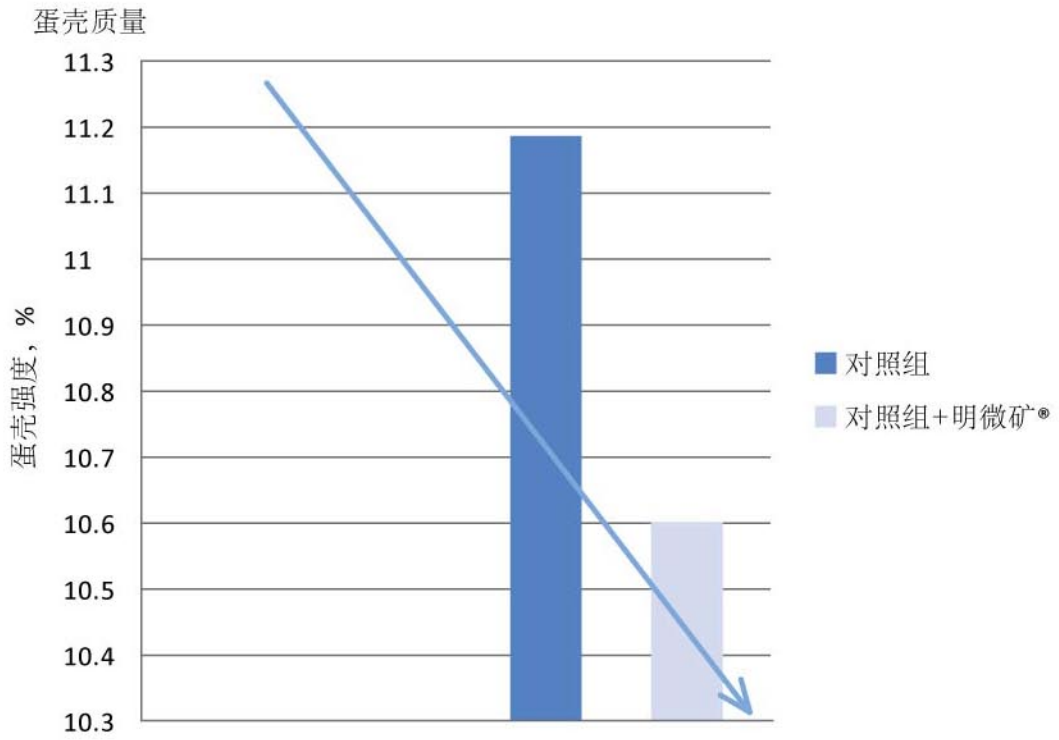


图二：明微矿® (Mintrex®) 对鸡蛋重量的影响



图三：明微矿® (Mintrex®) 的蛋壳强度

明微物®, Mintrex®可以提高产蛋后期的蛋壳质量
（在51周龄产蛋母鸡得日粮中添加明微®, Mintrex®）



图四： 明微矿® (Mintrex®) 的蛋壳质量

更小的添加量，效益更大
明微矿® (Mintrex®) 的优势在于将家禽所需的微量矿物质运送至吸收部位的同时，也向机体提高了所需的蛋氨酸。明微矿® (Mintrex®) 的高效转运机制可以改善家禽的健康状态，提高生产量，并最终增加业者的经济收益。

结论
饲喂高质量、高生物学效价的微量元素是最大化动物生长潜力及健康的关键因素。螯合微量元素具备更加有效的运送元素至动物体组织的潜力， 并且能更好的辅助动物细胞和组织中的生化反应过程。这些最终在很多方面加强了动物的生理功能和生长性能。

益生菌的平衡

所有的动物包括家禽都会有一些微生物菌群在肠道里生长、繁殖和定植。有些是暂时性菌群，它们只生长和繁殖，但不定植。它们停留一段时间，但是，当它们通过肠道，其效果显著。这两组当中，有用的益菌如：乳杆菌属(Lactobacillus)、芽孢杆菌属 (Bacillus) 和酵母(yeast) ，而其它的是有害的：大肠杆菌 (E.coli) 、沙门氏菌(Salmonella)、梭状芽胞杆 (Clostridia) 和弯曲杆菌 (Campylobacter)。健康的动物能够汲取益害生物之间的平衡。当这种平衡被干扰，有害菌会引起不适或疾病。在另一方面，当益菌占上风，一般健康会改善。我们采用选择性耐热芽孢形成杆菌种类，可显著地减少沙门氏菌(Salmonella)和梭状芽孢杆菌 (Clostridium) 。

两种类型的益生菌是

1. 增生类型：如 *Lactobacillus lactis, Lactobacillus casei, Lactobacillus plantarum, Lactobacillus delbrueckii spp bulgaricus, Lactobacillus rhamanosus, Enterococcus faecium, Bifidobacterium bifidum, Pediococcus acidilacti, Streptococcus salivaris spp thermophilus* 和 *Streptococcus diactilacticus*。增生菌与致病菌竞争效果较差。这是因为它们需要长时间的繁殖和需要大量地安置于肠道内。此外，它们对热和挤压很敏感。

2. 孢子形成类型 (**Microguard™**的组成)：如 *Bacillus subtilis, Bacillus toyoyi, Lactobacillus sporogenes, Bacillus licheniformis, Bacillus megaterium, Bacillus polymyxa* 和 *Bacillus mesentricus*。

枯草芽孢杆菌 (*Bacillus subtilis*) 有益于动物和家禽。有害细菌数大大地减少，而有益细菌增加。芽孢杆菌孢子能够在摄入鸡肠道的30-60分钟内发芽(Hoa *et al.*, 2000; Casula and Cutting, 2002)。

枯草芽孢杆菌 (*Bacillus subtilis*) 分泌一组肽称为表面活性肽 (*surfactins*)。这些表面活性肽(*surfactins*)破坏细菌的细胞膜并杀死他们。枯草杆菌 (*B. subtilis*) 还产生杆菌肽 (*bacitracin*) 以干扰（抑菌） 产气荚膜梭菌 (*C. perfringenes*) 的增殖，其它的产生某些抗生素如acidolin和acidophylin。

一些益生菌也产生有机酸，降低肠道pH值和抑制大肠杆菌（有害菌）的滋生。

当细菌进入肠道， 它通常会设法与受体结合。该受体是甘露糖生产凝集素（粘附素），显现在小肠内的绒毛。细菌首先会尝试与这些受体连接，然后开始繁殖。益生菌与有害细菌互相竞争以取得受体，同时也通过添加于饲料或饮水中的益生菌成功占领大部分的受体，把有害的细菌如大肠杆菌 (E. coli)、沙门氏菌 (Salmonella)、梭菌(Clostridia)、弯曲杆菌 (Campylobacter) 和弧菌(Vibrio) 排到肠道外。益生菌还与病原菌争夺养分和加强（肠道）免疫力。

Microguard™ 成分:
（孢子数，每公斤十亿）

- *Lactobacillus sporogenes* : 2000
- *B. subtilis* : 1000
- *B. licheniformis* : 500
- *B. megaterium* : 500
- *B. mesentricus* : 500
- *B. polymyxa* : 500

含*Saccharomyces boulardii*
总活菌计数：5000亿 (5×10^{12})

Microguard™ – 应用方法
在家禽方面，
饮水

小鸡	: 每天20 克/1000 只
大鸡和蛋鸡	: 每天20 克/1000 只
种鸡和肉鸡	: 每天10 克/1000 只

饲料

肉鸡/蛋鸡	: 100 克/吨
种鸡	: 100-500 克/吨

喷雾方式
棚，笼子，木糠，水箱等设备：在雏鸡到达的前一天，每5,000平方尺用100 克/5 公升的水。

小鸡：小鸡孵化后第一时间或在抵达农场后，每5,000只给予100 克/2 公升的水。

猪

仔猪	: 每5头1克(直到第10天)
	: 每5头2克(直到第30天)
小猪	: 100 克/吨饲料
中猪	: 50 克/ 吨饲料
大猪	: 50 克/ 吨饲料
母猪	: 100 克/ 吨饲料

绒毛的平均长度

添加 **Microguard™**

1.68µm

无添加 **Microguard™**

1.42µm

资料来源：Maxmillan Anderson博士, 2011年, Larrybeth菲律宾农场。

用量 （通过饮水）：从第1-5天，20 克/每1000只和过后至第35天，10 克/每1000 只。

表一、Microguard™ 对仔猪体重之影响

参数	对照	Microguard™
出生体重（公斤）	1.30	1.31
在第21天的平均体重 （公斤）	4.69	5.01
在第60天的平均体重 （公斤）	18.95	22.55
换肉率	1.61	1.39
在第60天的额外体重	-	+3.6公斤

添加量：从第1-30天 1 克/头和从第31-60天 50 克/吨饲料
资料来源：Anantha Moorthy 博士和 Joseph George 博士，Kolazhy种猪场，Kerala。

表二、Microguard™ 对仔猪生长性能之影响

参数	对照	Microguard™	差别
仔猪数量	200	200	-
采食量（克/天）	748	763	+2.00%
平均日增重（克/天）	475	515	+8.42%
换肉率	1.57	1.48	-5.73%

添加量： 100 克/吨 玉米 - 黄豆饲料
资料来源：Anantha Moorthy 博士和 Joseph George 博士，Kolazhy种猪场，Kerala。