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## LYSOFORTE® EFFICACY ON BROILER PERFORMANCE USING MAIZE – SOYA DIETS. METABOLIC AND DOSE RESPONSE TRIAL

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### KEY CONCLUSIONS

- *Lysoforte® showed to be a powerful biosurfactant with direct effect on fat digestibility*
- *Lysoforte® increased ME of diet by 123 kcal/kg of feed*
- *An improvement in protein digestibility was observed. An increase on N-retention and better total feed utilization were also observed*
- *Dose-response trial shown the best results with the application of Lysoforte® Booster at 500 g/t of feed*

### Introduction

Phospholipids and more particularly the lysophospholipids play an important role in animal nutrition as digestive surfactants. The more converted lysophospholipids have a higher HLB value (hydrophilic-lipophilic balance) and are much more powerful biosurfactants than the conventional lecithins. They assist in fat digestion by their “oil-in-water” emulsifying properties. They improve the emulsification of feed fats through micelle formation and enhance the absorption of nutrients. Feeds are better dispersed in the aqueous environment of the digestive tract, nutrient transport is becoming easier and nutrient absorption is enhanced through increased cell membrane permeability by the action of the lysophospholipids, more particularly the lysophosphatidylcholine (LPC). Collectively this leads to a better feed utilisation in terms of energy, proteins, fats and minerals and to more environmentally friendly animal production. Previous results from a metabolic trial (Huyghebaert, 1995) have demonstrated that Lysoforte improves the digestibility of the feed fats, but also of the other nutrients, such as proteins, contributing to improve the total feed digestibility.

The efficacy of LYSOFORTE® has been further investigated on typical maize-soya diets with broilers. In that respect a metabolic trial was done in India and a dose response trial was done in Romania in 2005.

### Metabolic study with LYSOFORTE® dry (Kemin Nutritional Technologies Pvt. Ltd)

#### Materials and methods

LYSOFORTE™ Dry contains phospholipids enriched in lysophospholipids (patented) on a dry carrier.

A total of 16 broilers Cobb-400 were individually housed in cages and distributed over two treatments:

- Control group: normal maize-soya based diet without phospholipids added
- Treatment: Control feed + LYSOFORTE™ Dry @ 500 g/ton

The metabolic trial was done for the two production phases, starter (forced feeding at day 21 @ 30 g per bird) and finisher (forced feeding at day 41 @ 50 g per bird). Birds were fed the respective diets during 5 days *Ad Libitum* and then were starved during 24 hours (water was given *Ad Libitum*).

The starter diet contained 3.5% of rice bran oil (unsaturated), while the finisher diet contained 2 % of rice bran oil plus another 2 % of mutton tallow (very saturated). Diets are corn-soya based and their nutritional levels were analysed (Table 1).

**Table 1. Diet composition and nutrient analysis**

<b>Feed ingredients %</b>	<b>Starter</b>	<b>Finisher</b>
Corn (cp 8%)	56.0	59.15
Soyabean meal (cp 45%)	27.1	28.0
Fish meal (cp 45%)	13.0	-
Broken rice (cp 9%)	-	1.0
Rice polish (cp 14%)	-	5.0
Rice bran oil (ME 7200 Kcal/kg)	3.5	2.0
Mutton tallow (ME 7400 Kcal/kg)	-	2.0
<b>Analysed nutrients (% on fresh matter)</b>		
Dry Matter	89.40	89.90
Crude Proteins	24.92	21.58
Crude Fat	7.84	5.55
Gross Energy (Kcal/kg)	4157	4029

Subsequent to forced feeding total faeces collection was done and quantified. These were further analysed for Dry Matter (DM) content, Crude Protein (CP), Crude Fat (CF) and Gross Energy (GE). Digestibility of DM, CP and CF were calculated as well as the Metabolisable Energy (ME) of the diets tested. As it is usual for poultry, the ME has been further corrected for nitrogen balance to zero (ME<sub>n</sub>) at 34.36 kJ per gram nitrogen retained (or 1 314 cal per gram of protein (as N \* 6.25) retained). This must eliminate the different effects of protein metabolism on the Metabolisable Energy results.

## Results and discussion

Fresh excreta samples were collected separately for each bird per treatment and quantified for both collections at day 22 and at day 42 (Table 2). DM content was analysed and also the other nutrients on DM-basis.

**Table 2. Nutrient analysis\* of excreta (on DM basis)**

<b>Proximate analysis (%)</b>	<b>Control</b>	<b>Treatment</b>
<b>Starter Phase</b>		
Excreta Weight (g) per bird	7.14	6.76
Dry Matter	96.50	96.70
Crude Protein	29.44	27.52
Crude Fat	5.27	4.67
Gross Energy (kcal/kg)	Not analysed	
<b>Finisher Phase</b>		
Excreta Weight (g) per bird	12.89	11.48
Dry Matter	97.00	97.10
Crude Protein	28.22	26.40
Crude Fat	4.63	3.61
Gross Energy (kcal/kg)	3743	3666

\* Averages of the 8 birds of each treatment



Digestibility coefficients and ME are given in Table 3.

**Table 3. Nutrient Digestibility and ME of the experimental diets**

Digestibility (%)	Control	Treatment
<b>Starter Phase</b>		
DM-dig.	75.34	76.65
CP-dig.	71.88	75.12
CF-dig.	84.01	86.58
ME (kcal/kg)	Not analysed	
<b>Finisher Phase</b>		
DM-dig.	71.32	74.46
CP-dig.	66.29	71.91
CF-dig.	<b>78.48<sup>a</sup></b>	<b>85.07<sup>b</sup></b>
ME (kcal/kg)	3064	3187
MEpr (kcal/kg)	188	204
ME <sub>n</sub> (kcal/kg)	2876	2983

Mean values in same row with different superscripts are statistically different ( $p < 0.05$ )

Due to the high variation between replicates, the protein absorption values in the finisher phase are not statistically different. Lysoforte™ Dry improved dramatically the nutrient digestibility versus the control group. Lysoforte showed to be a powerful biosurfactant resulting in a very high effect on fat digestibility in the starter and especially in the finisher phase (because of the presence of 2% mutton tallow). Lysoforte™ Dry also increased the Metabolisable Energy content of the finisher diet with 123 kcal/kg feed. However, if the effect of protein utilisation is not counted for the Metabolisable Energy (ME<sub>n</sub> = Metabolisable Energy corrected for zero N-balance), then the increase in Metabolisable energy was 107 Kcal per kg feed.

Indeed, an important improvement in protein digestibility was observed, both in the starter and in finisher phase. This effect seems to be independent from the level and kind of fats that are used in the feed.

## Dose response trial with Lysoforte® booster dry with broilers on a maize-soya-diet (Prof. Dr Mircea Pop, Faculty of Animal Husbandry IASI-Romania)

### Materials and methods

Lysoforte® Booster Dry from Kemin Europa is a concentrated form of phospholipids enriched in lysophospholipids (patented) on a dry carrier.

A total of 240 broilers hybrid Shaver Starbro from Hungary were housed per ten (as hatched) in cages and distributed over four treatments:

- Control group: normal maize-soya based diet without phospholipids added
- Treatment 1: Control feed + Lysoforte® Booster @ 250 g/ton
- Treatment 2: Control feed + Lysoforte® Booster @ 500 g/ton
- Treatment 3: Control feed + Lysoforte® Booster @ 750 g/ton

The trial lasted 38 days and a three phase feeding program was applied and feeding was *Ad Libitum*:

- starter from 0-10 days
- grower from 11-31 days
- finisher from 32-38 days

Feed formulas are made according to industrial standards in Romania (Table 1). Feeds were mainly maize-soya based; no animal proteins were added and no Antibiotic Growth Promoters (AGP) were used. Coccidiostats were added in starter and grower feeds.



The main composition of the 3 diets is given in Table 1. Starter feeds were given as crumbles and the grower-finisher feeds as pellets.

Chickens were weighed at day 0, day 9, day 19 and day 38. Total feed consumption was measured at day 38 and FCR calculated.

**Table 1. Diet composition**

<b>Ingredients %</b>	<b>Starter feed</b>	<b>Grower feed</b>	<b>Finisher feed</b>
Maize	48.54	48.36	44.84
Maize gluten meal	7.58	6.00	6.50
Barley	-	-	10.00
Soybean meal	28.50	18.34	10.90
Full fat soya	7.96	20.76	21.64
Molasses	-	2.00	2.00
Amino acids & macro-min	4.31	3.93	3.59
Vit-Min. premix	0.50	0.50	0.50
Cygro	0.06	0.06	-
Phytase	-	0.03	0.03
KEMZYME MS DRY	0.05	-	-
<b>Specifications (g/kg)</b>			
Crude proteins	240.00	220.00	200.00
Crude fat	62.70	63.70	64.30
Lysine dig.	13.20	11.40	9.40
Methionine dig.	6.40	5.70	4.60
Calcium	10.00	9.00	8.50
Phosphorus dig.	5.00	4.50	4.20
Met. Energy (kcal/kg)	3195	3175	3225

## Results and discussion

Performance of the chickens was determined on the basis of feed intake, body weight gain and feed conversion ratio (FCR). Zootechnical parameters from the treated groups of birds are compared with those of the control group, as well as with each other, using appropriate statistical tests and accepting a level of probability of less than 0.05 as indicative of differences of significance (Table 2).

**Table 2. Zootechnical performances at day 38**

<b>Parameters</b>	<b>Control</b>	<b>Lys-250</b>	<b>Lys-500</b>	<b>Lys-750</b>
Initial weight (g) at day 0	42.2	42.8	42.5	42.6
Final weight (g) at day 38	2034	2049	2101	2083
ADWG (g/day)	52.41	52.79	54.17	53.69
Total feed consumption (g/bird)*	3664	3680	3651	3671
ADFI (g/day)	96.42	96.84	96.08	96.61
FCR*	1.844	1.838	1.778	1.802
FCR**	1.796	1.801	1.712	1.718
FCR***	1.783	1.782	1.672	1.685
Losses % (culled and mortalities)	10.00	8.33	10.00	6.67

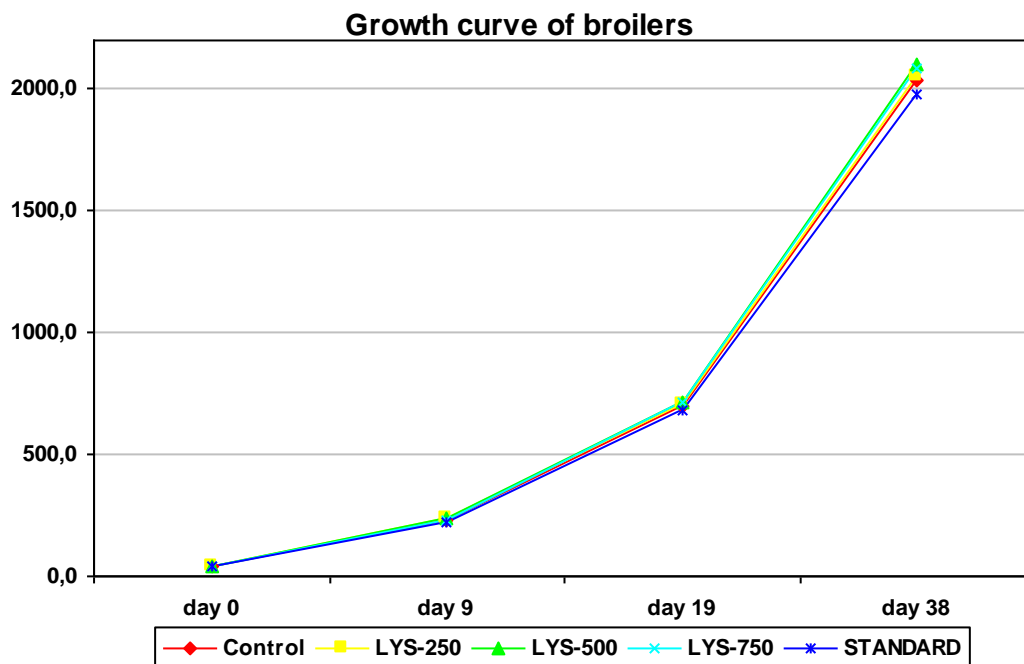
\* Excluding weight of death and culled birds

\*\* Including weight of death and culled birds

\*\*\* Including weight of death and culled birds and corrected for final weight 2 kg (1 point for 25 g)

Growth performances during the different experimental periods are presented in the graph below and are compared with the standards of the breeding company.





Growth performances in this trial were above the breed standards. All Lysoforte treatments showed higher growth performances in the second period (after 19 days) of fattening, with the best results achieved for an application of Lysoforte Booster at 500 g/ton, as well for growth as for FCR.

An application of 250 gram per ton seems not to give the response that was expected in this trial.

Also, an application of 750 gram per ton did not give a better response than with 500 gram per ton revealing to be economically not justified.

## Conclusions

Both trials have shown that Lysoforte® Booster has a good effect on fat digestibility, and by that increases the metabolisable energy of broiler diets and, as a consequence, lowers FCR. This confirms previous bio efficacy findings with broilers (Huyghebaert, 1995) and also confirms the effect of Lysoforte® on stimulating absorption of saturated (Adams, 1996) and polyunsaturated (Adams, 1996) fatty acids by living cells.

There is good evidence that Lysoforte® Booster also improves protein digestibility and, as a consequence, can be expected better amino acid utilization. This must result in an increase in the growth rate of the animals which was also shown in these trials.

This trial also confirms previous findings (Huyghebaert, 1995) that an application of this specific phospholipid, enriched in lysophospholipids, not only improves fat digestibility resulting in an increase of the Metabolisable Energy of the diet, but also results in an increase in N-retention and in a better total feed utilization.

## References

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