A combination of lysolecithin, synthetic emulsifier and monoglycerides in broiler diets improves performance, fat digestibility and profitability

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Introduction

Supplementing a combination of lysolecithin, synthetic emulsifier, and monoglycerides (LYSOFORTE® EXTEND, LEX), has been previously used in broiler diets reduced in AME, showing improved digestibility of nutrients and energy utilization. However, there is limited research on its effect in diets reduced in both AME and amino acid content. This study investigates the effects of supplementing LEX in broiler diets reduced in AME and amino acids on performance, nutrient digestibility and profitability.

Material and methods

- Location: POZNAN University of Life Sciences – Poland.
- A total of 720 one-day-old males Ross 308 broilers were randomly assigned to 3 dietary treatments for 42 days, each with 20 pens of 13 birds :

Positive Control (PC)	Negative Control (NC)	NC+LEX
Control basal diet	PC reformulated to reduce AME and digestible amino acids 72 kcal/kg and 1.5% respectively	NC + 500 ppm of a combination of lysolecithins, synthetic emulsifier and monoglycerides

- 3-phase feeding system: starter (in crumbles, 1-10d), grower (in pellets, 11-21d) and finisher (in pellets, 22-42d).
- All feeds were manufactured at Poznan University feed mill. All feeds contained phytase (500 FTU/kg) and xylanase. Feed formulation is presented in Table 1.
- **Measured parameters:**
  - Mortality was recorded daily. Feed intake and body weights were recorded on days 10, 21 and 42. The feed conversion ratio (FCR) (mortality corrected) was calculated using BWG and FI data.
  - On day 28, 60 chickens (1 birds/pen, 20 birds/treatment) were randomly selected and euthanized and ileal digesta and caeca samples were collected. The values of ileal digestibility of crude protein and fat of the diets were calculated in relation to the TiO2 ratio of the nutrient content of the feed, digesta.
  - Pens were the experimental unit, and $P<0.05$ was considered significant. All data were calculated using the analysis of variance of the general linear model procedure under the SAS.
  - To assess the profitability, a calculation of the IOFC for each treatment was performed. It involved performance data, feed cost per feeding phase, and price per kg of live weight at farm gate.

Table 1. Ingredient and nutrient composition of the experimental diets

	Starter		Grower		Finisher	
Ingredients	PC	NC	PC	NC	PC	NC
Maize	42.75	39.30	47.55	44.06	51.69	48.47
Wheat	15.00	15.00	15.00	15.00	15.00	15.00
Triticale	-	5.00	-	5.00	-	5.00
Sunflower M 38%	-	1.32	-	1.37	-	1.04
Soybean M 46%	36.40	34.55	31.89	30.01	28.02	26.35
Soya oil	1.97	1.00	2.27	1.30	2.33	1.30
MCP	0.932	0.916	0.715	0.699	0.492	0.478
Sodium bicarb.	0.217	0.225	0.165	0.171	0.133	0.132
Limestone	0.563	0.551	0.377	0.365	0.372	0.361
Sodium chloride	0.285	0.280	0.300	0.296	0.300	0.300
DL-Methionine	0.353	0.339	0.309	0.295	0.280	0.267
L-Lysine HCl	0.306	0.316	0.258	0.268	0.242	0.250
L-Threonine	0.141	0.140	0.108	0.107	0.098	0.096
L-Valine	0.059	0.053	0.036	0.030	0.024	0.019
Phytase 5000	0.010	0.010	0.010	0.010	0.010	0.010
Xylanase	0.020	0.020	0.020	0.020	0.020	0.020
Vit-Min premix*	1.000	1.000	1.000	1.000	1.000	1.000
Feed cost (€/t)	339.0	326.8	326.8	314.6	315.5	303.1
Nutrients**	PC	NC	NC+LEX	PC	NC	NE+LEX	PC	NC	NC+LEX
AME (kcal/kg)	2975	2903	2903	3050	2978	2978	3100	3028	3028
Crude protein (%)	23.46 (23.49)	23.56 (23.62)	23.56 (23.64)	21.71 (21.75)	21.49 (21.63)	21.49 (21.22)	20.27 (19.39)	20.04 (19.54)	20.04 (19.84)
Crude fat (%)	4.21 (4.34)	3.18 (3.26)	3.18 (3.42)	4.59 (4.74)	3.57 (3.72)	3.57 (3.48)	4.72 (4.44)	3.65 (3.51)	3.65 (3.36)
Dig. Lys (%)	1.30	1.28	1.28	1.16	1.14	1.14	1.06	1.04	1.04

*Provides per kg diet: IU: vit. A 11250. cholecalciferol 2500; mg: vit. E 80, menadione 2.50, vit. B12 0.02, folic acid 1.17, choline 379, D-pantothenic acid 12.5, riboflavin 7.0, niacin 41.67, thiamin 2.17, D-biotin 0.18, pyridoxine 4.0, ethoxyquin 0,09. Mn 73, Zn 55, Fe 45, Cu 20, I 0.62, Se 0.3, Robenidin 36 mg. **Analyzed values in brackets ().

Results

Table 2. Performance results

	Starter (0-10 d)			Grower (11-21 d)			Finisher (22-42 d)			**Overall (0-42 d)**		
	BWG	FI	FCR	BWG	FI	FCR	BWG	FI	FCR	**BWG**	**FI**	**FCR**
PC	276.8^{a}	298.6^{ab}	1.0798^{b}	871.8^{a}	1041^{b}	1.1942^{b}	2127	3855	1.8174^{b}	**3317^{a}**	**5194^{b}**	**1.5675^{b}**
NC	262.5^{b}	308.5^{a}	1.1819^{a}	786.6^{b}	1108^{a}	1.4096^{a}	2074	3917	1.8904^{a}	**3165^{b}**	**5333^{a}**	**1.6859^{a}**
NC+LEX	276.8^{a}	297.3^{b}	1.075^{b}	852.4^{a}	1034^{b}	1.2137^{b}	2108	3829	1.8203^{b}	**3278^{a}**	**5161^{b}**	**1.5754^{b}**
SEM	2.356	1.835	0.011	6.143	6.795	0.014	14.93	16.27	0.0121	**16.86**	**19.97**	**0.0097**
P value	0.0137	0.0209	<0.001	0.001	<0.001	<0.001	0.3467	0.0758	0.0177	**<0.001**	**<0.001**	**<0.001**

abc - means in the column with different letters are significantly different at P≤0.05

Table 3. Ileal digestibility of crude protein and fat of broiler chickens in each experimental group.

	CP digestibility	EE digestibility
PC	0.780	0.9139^{a}
NC	0.798	0.8770^{b}
NC+LEX	**0.825**	**0.9252^{a}**
SEM	0.0058	0.0050
P value	0.1184	<0.001

abc - means in the column with different letters are significantly different at P≤0.05

Table 4. Income over feed costs (IOFC) of each experimental treatment.

	PC	NC	NC+LEX
Broiler price (€/kg)	1.2	1.2	1.2
Income on live weight (€/1000 birds)	3980.4	3798	3933.6
Feed cost (€/1000 birds)	1657.7	1636.6	1593.3
Income over feed cost IOFC (€/1000 birds)	2322.7	2161.4	2340.3
Difference in IOFC vs. PC (€/1000 birds)		-161.4	**17.5**
Difference in IOFC vs. NC (€/1000 birds)	161.4		**178.9**

Conclusion

The study shows that adding LEX to broiler diets reduced in AME and amino acids improved growth performance, fat digestibility, and profitability. LEX supplementation did not impair growth performance compared to broilers fed PC more expensive diets, higher in AME and amino acid content, resulting in feed cost reduction and improved profitability.

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