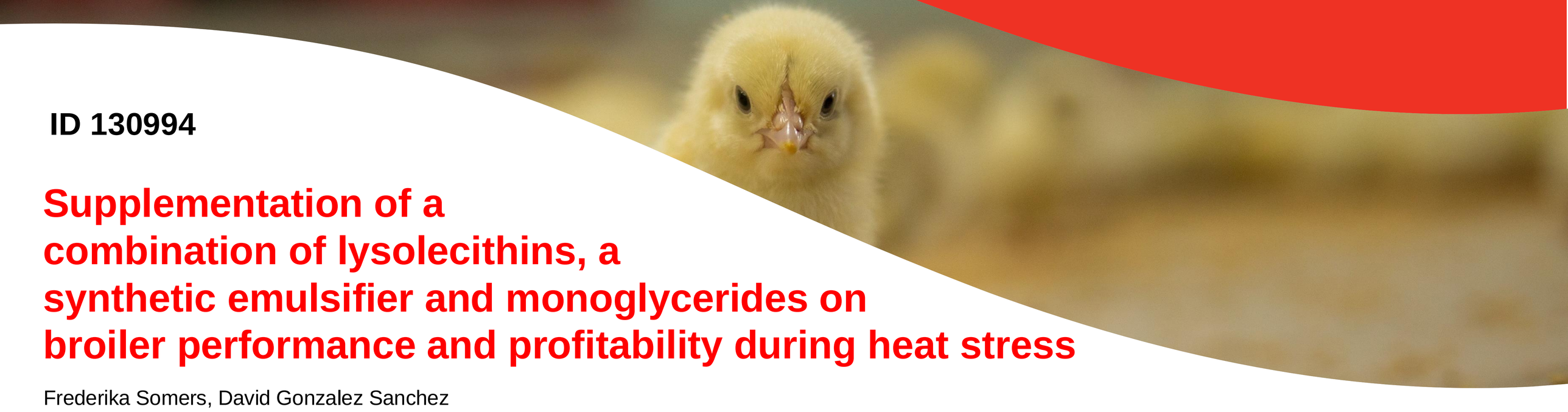

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Supplementation of a combination of lysolecithins, a synthetic emulsifier and monoglycerides on broiler performance and profitability during heat stress

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Introduction

Faster growth and higher metabolic rates of modern broiler genetics result in more body heat produced, increasing predisposition to heat stress.
A study was conducted to assess the impact of supplementing the diet of broilers subjected to heat stress with a combination of lysolecithins, a synthetic emulsifier and monoglycerides (LEX), on improving performance and ultimate production profitability.

Experimental design and diets

- Location: Tests &Trials broiler research farm, Huesca, Spain.
- A total of 640 one-day-old males Ross 308 broilers were randomly assigned to two dietary treatments for 42 days, each with 16 pens of 24 birds :

Control	LEX
standard maize-soybean diet-wheat diet.	control + 500 ppm of a combination of lysolecithins, a synthetic emulsifier and monoglycerides

- Diets were produced in mash and fed in 3 phases: starter (0-15 d), grower (15-30 d) and finisher (30-42 d)
- Heat stress protocol: during day 21 to 35, the temperature was daily 30ºC from 10 a.m. to 8 p.m., after which it dropped to 25° C until 10 a.m. in the morning. During the last 7 days of the trial (from day 35 to 42) the birds experienced a constant temperature of 30ºC.
- **Measured parameters:**
  - Bird weight at day 0, 15, 30 and 42. Feed bags, as well as feed remaining in the feeders, were weighed at the same time to calculate feed intake and feed conversion ratio (FCR).
  - A pen was considered the experimental unit. All productive parameters were analyzed using a General Linear Model (GLM) and means were separated with Tukey's post-hoc comparison test. Significant differences were declared at $p<0.05$, while trends were considered for $0.05 \leq p \leq 0.10$
  - An economic analysis was carried out to determine the income over feed cost (IOFC), considering the broiler price per kg of live weight, the feed intake and feed cost for every growing period (0-15 d, 15-30 d and 30-42 d), and the body weight at 42 d of both treatments.

Table 1. Ingredient and nutrient composition of the experimental diets

	Starter (0-15 days)		Grower (15-30 days)		Finisher (30-42 days)	
Ingredients (%)	**Control**	**LEX**	**Control**	**LEX**	**Control**	**LEX**
Corn	46.00	45.98	48.89	48.86	54.45	54.42
Wheat	10.00	10.00	10.00	10.00	10.00	10.00
Soybean meal 47% CP	36.90	36.90	34.50	34.50	29.40	29.40
Soya oil	2.70	2.70	3.10	3.10	3.00	3.00
MCP	1.08	1.08	0.88	0.88	0.58	0.58
Sodium Bicarbonate	0.27	0.27	0.20	0.20	0.17	0.17
Limestone	1.13	1.10	0.86	0.84	0.90	0.88
Sodium chloride	0.26	0.26	0.28	0.28	0.28	0.28
DL-Methionine	0.38	0.38	0.32	0.32	0.30	0.30
L-Lysine HCl	0.29	0.29	0.19	0.19	0.20	0.20
L-Threonine	0.15	0.15	0.10	0.10	0.10	0.10
L-Valine	0.08	0.08	0.02	0.02	0.02	0.02
KEMZYME PLUS P	0.10	0.10	0.10	0.10	0.10	0.10
Vit-Min Premix	0.50	0.50	0.40	0.40	0.40	0.40
Maxiban	0.06	0.06	0.06	0.06	-	-
LYSOFORTE EXTEND	-	0.05	-	0.05	-	0.05
Nutrients (calculated)						
AME (kcal/kg)	2965	2965	3030	3030	3085	3085
Crude Protein (%)	22.50	22.50	21.44	21.44	19.50	19.50
Fat (%)	4.54	4.53	5.08	5.07	5.09	5.09
Crude Fibre (%)	2.78	2.78	2.77	2.77	2.69	2.69
Dig. Lysine (%)	1.26	1.26	1.15	1.15	1.02	1.02
Calcium (%)	0.95	0.95	0.86	0.86	0.78	0.78
Total P (%)	0.66	0.66	0.59	0.59	0.51	0.51
Dig. P (%)	0.45	0.45	0.40	0.40	0.34	0.34
Sodium (%)	0.19	0.19	0.17	0.17	0.16	0.16
Nutrients (analyzed)						
Moisture	10.90	10.70	10.30	10.20	11.50	11.60
Crude Protein (%)	23.70	23.50	20.70	21.50	20.70	20.30
Fat (%)	4.60	4.90	5.20	5.40	4.90	5.00
Crude Fibre (%)	3.90	4.10	3.80	3.90	4.40	4.00
Ash (%)	6.00	5.90	5.20	5.10	4.70	4.60

Results

Table 2. Performance results

	CONTROL[1]	LEX[1]	SEM[2]	P-Value
BW[3] day 0,	41.5	41.7	0.300	0.8717
BW day 15, g	524	538	6.580	0.0985
BW day 30, g	1800	1823	14.800	0.2842
BW day 42, g	3033	3094	18.200	**0.0580**
ADG[4] 0-15 d, g/d	31.9	32.8	0.497	0.2017
ADG 15-30 d, g/d	84.9	85.2	0.971	0.9618
ADG 30-42 d, g/d	100	105	1.550	**0.0172**
ADG 0-42, g/d	69.9	71.4	0.611	**0.0610**
ADFI[5] 0-15 d, g/d	50.2	50.1	0.639	0.9716
ADFI 15-30 d, g/d	108	111	1.170	0.0760
ADFI 30-42 d, g/d	186	188	2.190	0.4923
ADFI 0-42 d, g/d	109	110	1.010	0.4469
FCR[6] 0-15 d,	1.57	1.53	0.0222	**0.0983**
FCR 15-30 d,	1.27	1.30	0.0133	0.1096
FCR 30-42 d,	1.85	1.80	0.0221	**0.0412**
FCR 0-42 d,	1.55	1.54	0.0071	0.1220
Mortality (%)	4.74	5.54	0.3340	0.4260

[1]Least square means; [2]SEM: Standard error of the mean; [3]BW average body weight/bird [4]ADG: Average Daily Gain corrected for mortality; [5]ADFI: Average Daily Feed Intake corrected for mortality; [6]FCR Feed Conversion Ratio corrected for mortality. Means separated by Tukey´s (GLM) with significant difference at $p \leq 0.05$.

Table 3. The impact of LEX on overall income over feed costs (IOFC).

	Control	LEX
Total FI day 0-15 (avg. g/bird)	753	751.5
Total FI day 15-30 (avg. g/bird)	1620	1665
Total FI day 30-42 (avg. g/bird)	2232	2256
Final BW (avg. g/bird)	3033	3094
Broiler price (€/kg)	1.35	1.35
Income (€/1000 birds)	**4094.55**	**4176.9**
Feed cost* (€/1000 birds)	**1818.65**	**1858.02**
Income over feed cost (€/1000 birds)	**2275.90**	**2318.88**
Additional IOFC for LEX vs. Control (€/1000 birds)		**+ 43**

*based on Standard broiler Starter feed = 417.88 €/ton; Standard broiler Grower feed = 406.21 €/ton; Standard broiler Finisher feed = 379 €/ton (prices of week 43-2023)

Conclusion

These findings indicate, that adding LEX to diets of broilers raised under heat stress conditions tended to increase average daily gain (+1.5 g/d) and final body weight (+61 g) delivering a positive economic impact (+43 €/1000 birds IOFC).

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