Efficacy assessment of anti-CCK chickens egg yolk antibodies as enhancer of broiler performance

J. BRUFAU [1 *] ; A. PEREZ VENDRELL [1]; L. FANG[2] and R.R. MARQUARDT [2]

[1] IRTA, Mas de Bover, Crta. Reus-El Morell, Km 3.8, E-43120 Constanti , Spain
[2] Zyme Fast Inc, Box 1,Group 14, Oak bank, Manitoba R0E 1J1, Canada
* Corresponding author: Joaquim.Brufau@irta.es

The efficacy of anti-CCK chicken's egg yolk antibodies as a performance enhancer in broiler feeding was assessed. CCK (cholecystokinin) is a gastric peptide that inhibits appetite. Six hundred and forty male broiler chicks were allocated into 16 pens. The experimental product DEAP (Dried, Egg, Anti-CCK, Product) was mixed with Sipernat ® 320 at 2.0 % in order to increase its flowability and mixing capacity. Levels of inclusion of DEAP in the diet were 0, 102 , 255 and 612 g per Tm. The basal diet was based on wheat-maize-barley soybean meal (3150 Kcal /kg ME, 22 % protein). The 4 experimental treatments were replicated four times. The DEAP supplementation increased the average daily gain at 7, 21 and 25 days significantly (P < 0.03) having a linear effect with a R^2 of 0.63. The feed to gain ratio was also numerically improved. Chickens fed with high doses of DEAP had an 8 % higher body weight gain compared to that of the control group (1125 vs 1036) at 25 days. DEAP had no significant effect on daily feed intake.

Keywords : cholecystokinin CCK; anti-CCK egg yolk antibodies; broiler performance

Introduction

CCK (cholecystokinin) is a gastric peptide that inhibits appetite. Antibodies that react with CCK have been shown to neutralize the appetite suppressing effects of CCK (Hooge 1998, Cook 2004). As a result feed intake, weight gain and efficiency of feed utilization have been shown to be increased. This occurs when either the antigen (a conjugate CCK) or its antibody, as produced in the egg, is either injected or administered orally. Results in the literature have shown that performance improved from a high of 10 % to as low as 2 %, and was even negative in a few responses. In one very large study performance increases in broilers were around 3%. Cook et al, (1999), did the initial studies on the feeding of egg antibodies. The objective of this study was to assess the efficacy of anti-CCK chicken's antibodies as performance enhancer produced by Zyme Fast Inc. The study was performed using a dose response experiment in broiler chickens.

Materials and Methods

The experiment lasted four weeks. 640 male broiler chicks of the Ross 308 strain were used. The chicks were allocated into 16 pens of 3.85 m^2 each, in a house provided with artificial light and gas heating. The chickens were distributed at random at 40 chickens per pen (stocking density 10.4 birds/m^2). Temperature inside the houses on arrival was 33-35ºC and afterwards decreased by 3ºC each week.. Feed in mash form and water were provided *ad-libitum* throughout the experiment.

The premix and experimental feeds was manufactured at IRTA. All macro ingredients were weighted and ground through a 25 CV hammer mill until the particles pass through a 3 mm sieve. The

experimental product DEAP (Dried, Egg, Anti-CCK, Product from Zyme Fast, Winnipeg, Canada) was mixed a ratio of 98 part of product with 2 part of Sipernat ® 320 (98:2) in order to increase the flow and mixing capacity before to be used. DEAP with 2 % of Sipernat ® (www.Degussa.com) was added to the final feed using a previous mix of this product with 10 % of the final feed.

Chickens were fed with a single diet from 0 to 25 days with 3150 Kcal/kg ME and 22% of protein. The ingredient composition was based on 35 % wheat + 13% maize+ 5% barley+ 3% rye + 32% Soybean + 3% fish meal. The feed used in this trial did not contain antibiotic growth promoters and any other feed additive. There were 4 experimental treatments allocated at random by blocks (two blocks), according to the location in the experimental room. Treatments were replicated four times. The arrangement of treatments was: T-1 control 0 g of DEAP/Tm; T-2 102 g of DEAP/Tm ; T-3 255g of DEAP/Tm; T-4 612 g of DEAP/Tm of feed.

Chicks were weighed in bulk on arrival, and per pen at 7 and 25 days. Average daily gain, average daily feed consumption and feed to gain ratio were calculated for the periods 0 to 7 days, 7 to 25 days, and for the overall experiment. Mortality was checked and recorded daily, including the cause of the death. Data was analyzed as a randomized complete block design by two-way analysis of the variance (block and treatment) by using the General Linear Models (GLM) procedures of SAS. Treatment means were compared by using Duncan's multiple range tests.

Results and Discussion

In the first week of live, chickens fed with DEAP at different levels of supplementation did not shown any effect on daily feed intake and daily weight gain. However the linear effect on average daily weight and the body weight of chickens at seven days was statistically significant at $P < 0.03$ (Table 1). This linear effect is not relevant as the R^2 (0.28) was.

Table 1.- Birds performance first week (0-7 days)

DEAP (*)	ADW (g)	DFI (g)	FCR	BW(7d) (g)	Mortality
T-1	14.2	20.7	1.425	142.9	0
T-2	14.1	21.8	1.545	142.3	0.6
T-3	14.3	20.6	1.440	143.6	3.6
T-4	15.6	21.2	1.360	152.5	0.6
Pr >F	NS	NS	NS	NS	NS
Linear effect/R^2	0.03/ 0.28	NS	NS	0.03/ 0.28	
MSE	1.02	1.22	0.12	7.2	

(*) DEAP = Dried Egg Anti-CKK Product.

The inclusion of DEAP increased the average of daily gain and the final body weight of chickens between seven days and the end of the experiment (table 2). Those effects were linear and statistically significant ($P< 0.01$) and the R^2 were relevant in each case. The linear equation established for average daily gain (ADG) was $Y= 0{,}0068x + 50, 62$ with a $R^2 = 0.61$. In consequence the linear effect of DEAP on the final body weight had also a similar trend $Y = 0{,}1407x + 1041, 6$ with a R^2 0.63. The daily feed intake was not modified by the inclusion of DEAP. The feed conversion rate of chickens was improved according the rate of DEAP inclusion. However that tendency was not statistically significant.

Table 2.- Birds performance from seven days until the end of the experimental period (7 - 25 days)

DEAP (*)	ADG (g)	DFI (g)	FCR	BW(25d) (g)	Mortality %
T-1	49.6b	88.1	1.775	1036.4b	0
T-2	51.1b	91.7	1.797	1069.9b	3.6
T-3	51.7ab	85.6	1.652	1075.2b	2.5
T-4	54.0a	90.7	1.680	1125.4a	1.8
Pr >F	0.01	NS	NS	0.01	
Linear effect/R^2	0.01/ 0.61	NS	NS	0.01/ 0.63	
MSE	1.4	6.3	0.13	28.8	

(*) DEAP = Dried Egg Anti-CKK Product.

Regarding the whole experiment (table 3), DEAP inclusion in chicken feed in the early feeding stage increased significantly the average daily gain without any effect on daily feed intake. Feed conversion rate was also numerically improved. The effect on the average daily gain was statistically significant and linear ($P< 0.01$); $Y = 0{,}0056x + 39, 94$ with a $R^2 = 0.63$(Figure 1). The European Poultry Efficiency Production (EPEP) value which include the effect of mortality was also significantly ($P< 0.04$) improved by DEAP inclusion in the feed.

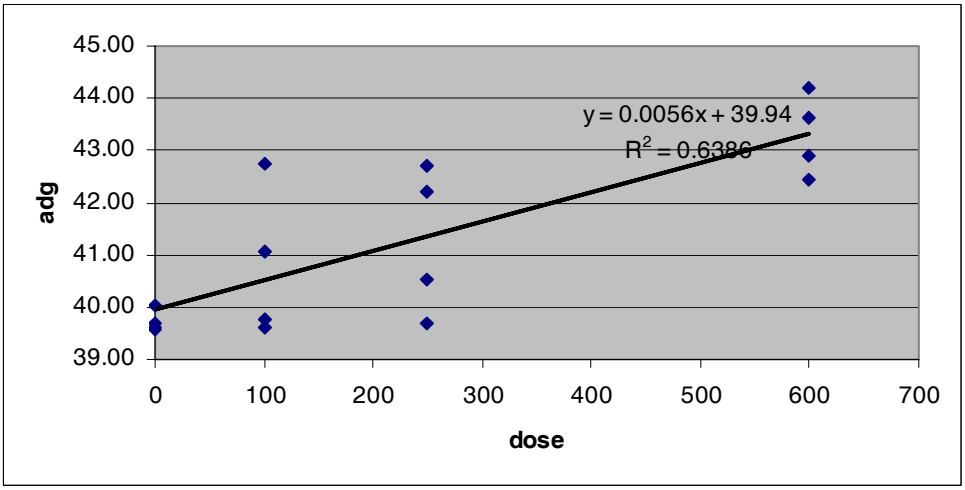
Table 3 .- Birds performance in the whole experimental period (0-25 days)

DEAP (*)	ADG (g)	DFI (g)	FCR	EPEP (**)	Mortality
T-1	39.7b	69.0	1.737	229.6b	0
T-2	40.7b	72.1	1.772	223.1b	4.2
T-3	41.3b	67.3	1.630	239.1ab	6.1
T-4	43.3a	71.2	1.645	275.0a	2.4
Pr >F	0.01	NS	NS	0.04	
Linear effect/R^2	0.01/ 0.63	NS	NS	0.05/ 0.23	
MSE	1.15	4.6	0.11	14.9	

(*) DEAP = Dried Egg Anti-CKK Product.;(**) EPEP = DWG * (100-% mortality) / 10 * FCR

The inclusion of DEAP (Dried, Egg, Anti-CCK, Product) in broiler mash feed that was composed of wheat, maize, barley and rye, had a linear effect on the average daily gain in chickens up to 25 days of age. The daily feed intake was not modified and as a consequence feed conversion rate was improved as well. Results from this experiment using DEAP with high flowing capacity in the feed confirm the data reported by Cook et al (1999)

Figure 1.- Linear effect of DEAP dose on ADG (0-25 days)



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