



Effects of bovine bile powder and enzyme treatment on performance of broilers fed high lipid diets



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INTRODUCTION

Restriction of lipids digestion and absorption is a problem in poultry nutrition. Some of the researcher is looking for the methods to increase the lipid digestion and absorption. Use of lipase is a method to dissolve this problem. In recent years many researchers were looking for new methods to overcome to this problem. Some of these methods include use of lipase enzyme, animal bile salts and etc. Much bile salt is wasted from animal slaughter house annually. If we find and resolve the problems associated with these wastes we can use these beneficial by products as animal and poultry feed to improve the fat digestibility and additionally the environmental useful effects will be followed. There are little researches about the effects of bile salts supplementation on performance of the birds. Maisonnier et al (2003) evaluate the effects of dietary bile salts on lipid digestibility of broilers chicks and found that lipids digestibility has been increased by addition of dietary bile salt. In this study we evaluate the effects of bovine bile salts with or without multi enzyme supplementation on broiler performance.

Materials and Methods

Birds, Housing and Cares:

Three hundred and sixty one-day-old broiler chicks of commercial strain (Ross 308) were randomly assigned to 4 dietary treatments (C, B, E and BE) with 9 replicate pens of 10 chicks each one. Each pen was one square meter and covered with wood shaving the house temperature was initially maintained at 32°C and reduced 2.8°C every week to reach a constant temperature of 20-22°C at 28 day of age, a continuous lighting was used for the first 3 days and a 23:1h light: dark cycle was applied for the rest of the experimental period. Birds were allowed free access to the feed and fresh water throughout the experiment.

Experimental design and diets:

Bovine bile in dark and liquid form earned from a slaughter house near the Tehran and then oven dried for 48h at 85 °C and then were milled to obtain bovine bile powder (BBP). Combo® Enzyme (CemGen Company product) obtained from *Bacillus lentus*, was used as a source of endo-β-D-Mannanase. The experiment was a completely randomized design with a 2×2 factorial arrangement of 2 levels of bovine bile powder or BBP (0 and 3.5 g/kg) and 2 level Combo enzyme supplementation (0 or 5g/kg). Thus four experimental dietary groups include:

- C) was fed a complete feed mixture without supplements
- B) was fed the same diet with 3.5 g kg⁻¹ BBP
- E) was loaded with 5 g kg⁻¹ CE
- BE) was loaded with 3.5 g kg⁻¹ BBP+5 g kg⁻¹ CE

The treatments were carried out for 42 days. Diets were formulated according to the recommended nutrient by Ross 308 manual for broiler chicks and were offered in mash form. The composition of the basal diet and experimental diets is shown in table 1. The starter, grower diets were provided similar nutrient and fed *ad libitum* from 0-21, and 22-42 days of age, respectively. The composition of the diets are shown in the below table.

Feed intake and weight gain were recorded weekly. Mortality were recorded and used for correcting of feed intake and weight gain and FCR.

Protein intake efficiency(PIE) and energy intake efficiency(EIE) were calculated by the following formulas:

$$EIE = (\text{weight gain} / \text{energy intake}) \times 100$$

$$PIE = (\text{weight gain} / \text{protein intake}) \times 100$$

Statistical Analysis:

Averages of the main effects, firsts and second order interactions are reported. A 2×2 factorial design was used to investigate the effects of BBP and enzymes treatment. The data were analyzed using the general linear model (GLM) procedure in SPSS 6.2.1 statistical software (SPSS, 2004). The second order effects were ranked using Duncan's multiple comparison method. The level of significance used was 0.05 for all tests.

Table 1. Composition of the basal diets (g/kg)

Ingredients	Starter(0-21d)	Grower(22-42 d)
Corn	583	669.1
Soybean meal (440 g/kg CP)	279.2	216.9
Corn gluten(600 g/kg CP)	50	61
Wheat bran	50	10
Soy oil	10	10
Di-Ca-Phosphate	8.1	10.5
Oyster shell	9.7	13.5
Sodium Chloride	2	1.5
Vitamin and Mineral premix *	6	6
DL- Methionine	2	0.5
Hcl-Lysine	0	1
Calculated analysis		
Metabolizable energy (MJ/kg)*	2932	3049
Crude protein(%)	21.1	19.7
Calcium(%)	1	0.9
Available Phosphorus(%)	0.45	0.35
Lysine(%)	1.2	1.04
Methionine+cystine(%)	0.9	0.72

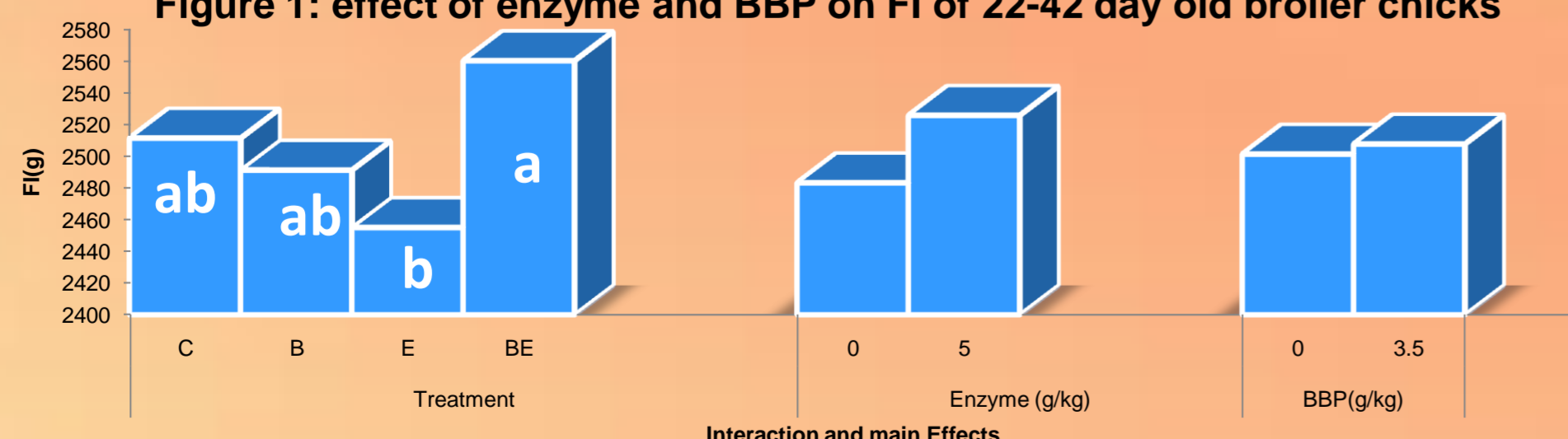
Results and discussion

Results of this study are shown in table 2 and 3 and figure 1-4.7. Result showed that BBP had no effects on performance traits (p>0.05).

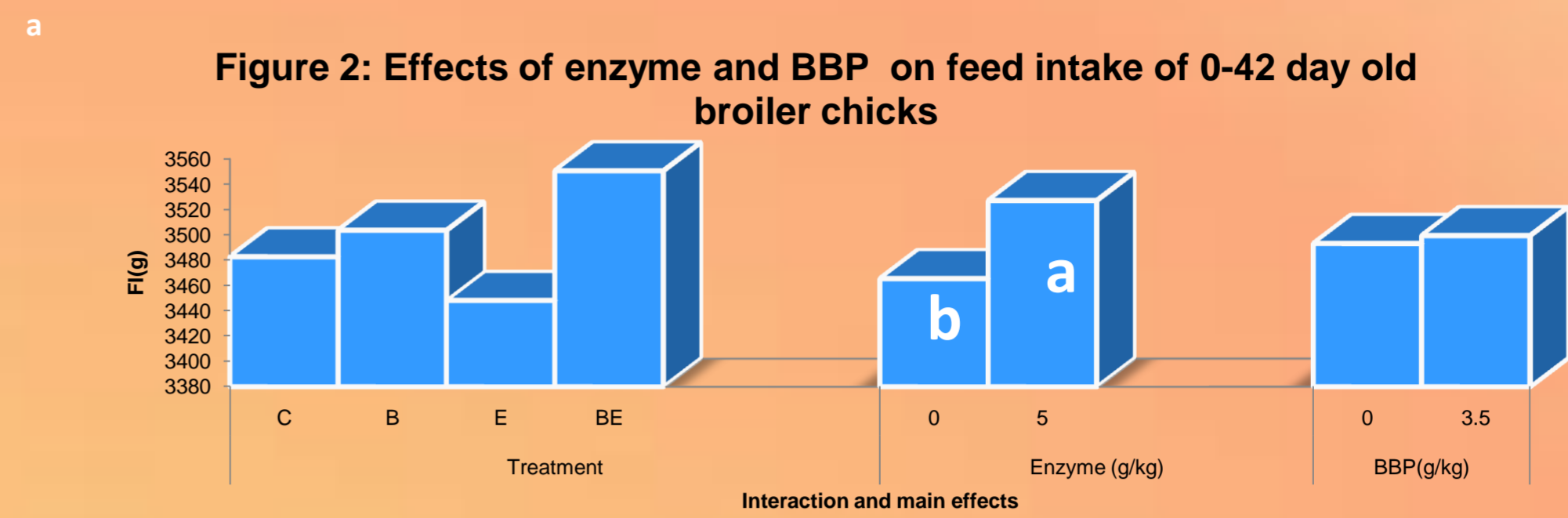
Table 2: Effects of BBP and multi enzyme addition on feed intake and weight gain of broilers

TREATMENT	FI			DFI			G			DG		
	0-3w	3-6w	0-6w	0-3w	3-6w	0-6w	0-3w	3-6w	0-6w	0-3w	3-6w	0-6w
C	983.1	2,511 ^{ab}	3,482	46.7	119.6	82.9	645.7	1,240	1,873	30.8	59.1	44.6
B	986.5	2,491 ^{ab}	3,503	46.9	119.6	83.4	630.8	1,234	1,855	30.2	58.8	44.0
E	986.2	2,455 ^b	3,448	46.8	115.9	82.1	637.3	1,226	1,877	30.3	58.4	44.7
BE	986.8	2,560 ^a	3,550	46.8	121.9	84.5	655.1	1,235	1,893	31.2	58.8	45.1
SEM												
P-Value	0.618	0.043	0.165	0.269	0.037	0.166	0.065	0.750	0.528	0.073	0.750	0.430
Main effects												
BBP	Ns	Ns	Ns	Ns	Ns	Ns	Ns	Ns	Ns	Ns	Ns	Ns
CE	Ns	Ns	0.041	Ns	0.035	0.041	Ns	Ns	Ns	Ns	Ns	Ns

Figure 1: effect of enzyme and BBP on FI of 22-42 day old broiler chicks

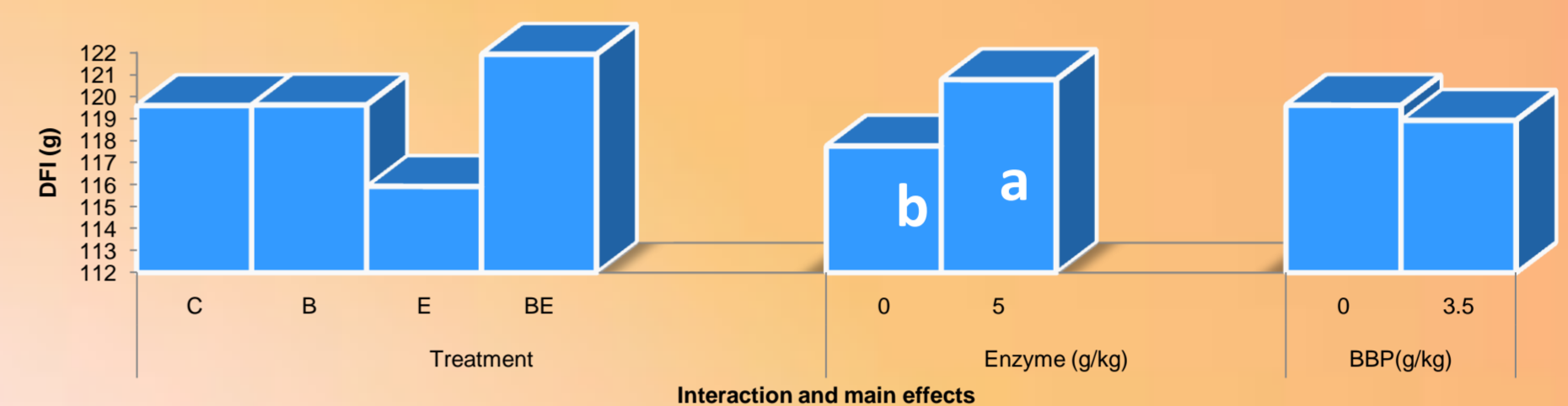


As seen in the above figure feed intake dosent affected by enzyme or BBP supplementation but their interaction were significant whenever that intake in BE treatment was 4% more than E treatment(p<0.05).



Feed intake of 0-42 day old broiler chicks increased (about 2%) by enzyme treatments (p<0.05) but not affected by BBP or interaction between BBP and Enzyme.

Figure 3: Effects of enzyme and BBP on daily feed intake of 21-42 day old broiler chicks



Enzyme supplementation increased daily feed intake in 0-42 day old broiler chicks by 1.8% on average and daily feed intake in 22-42 day old broiler chicks by 2.5% on average (p<0.05). In these cases the BBP has no effects on FI and there were no interaction between BBP and enzyme. Enzyme treatment increased energy intake efficiency. There were tendencies for WG (p=0.065), DWG (p=0.073) and PIE (p=0.060) in starter period to increased by BE dietary treatments. FCR and EIE haven't affected by any dietary treatments (p>0.05).

Figure 4: Effects of Enzyme and BBP on EIE of 0-42 day old broiler chicks

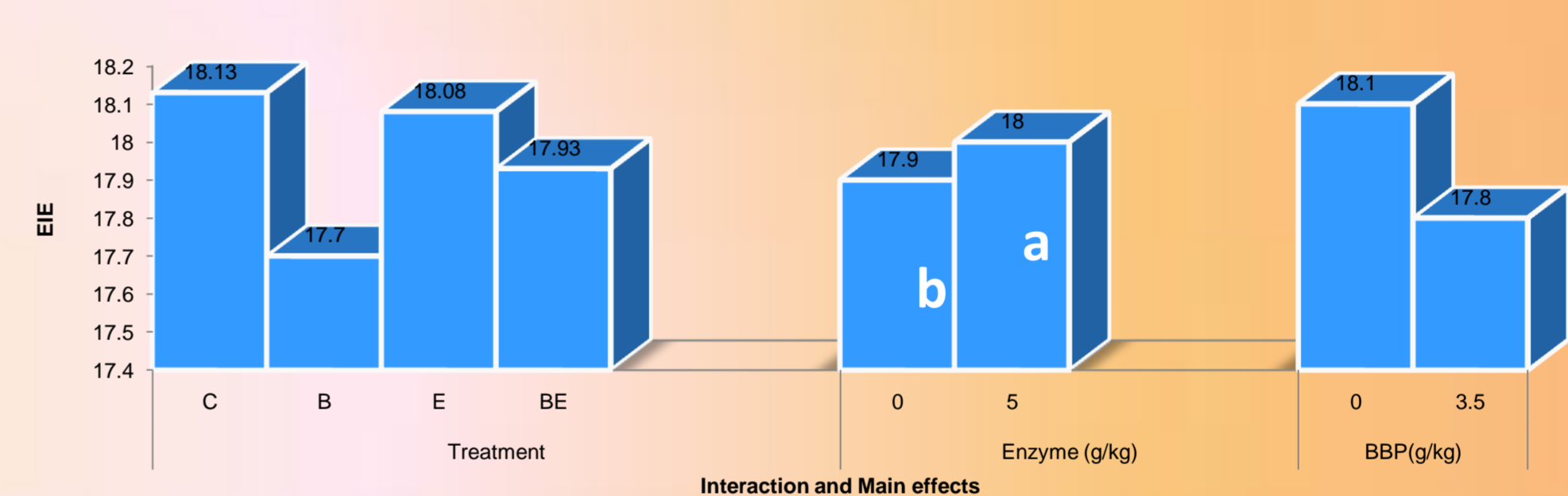


Figure 5: Effects of enzyme and BBP on DFI of 0-42 day old broiler chicks

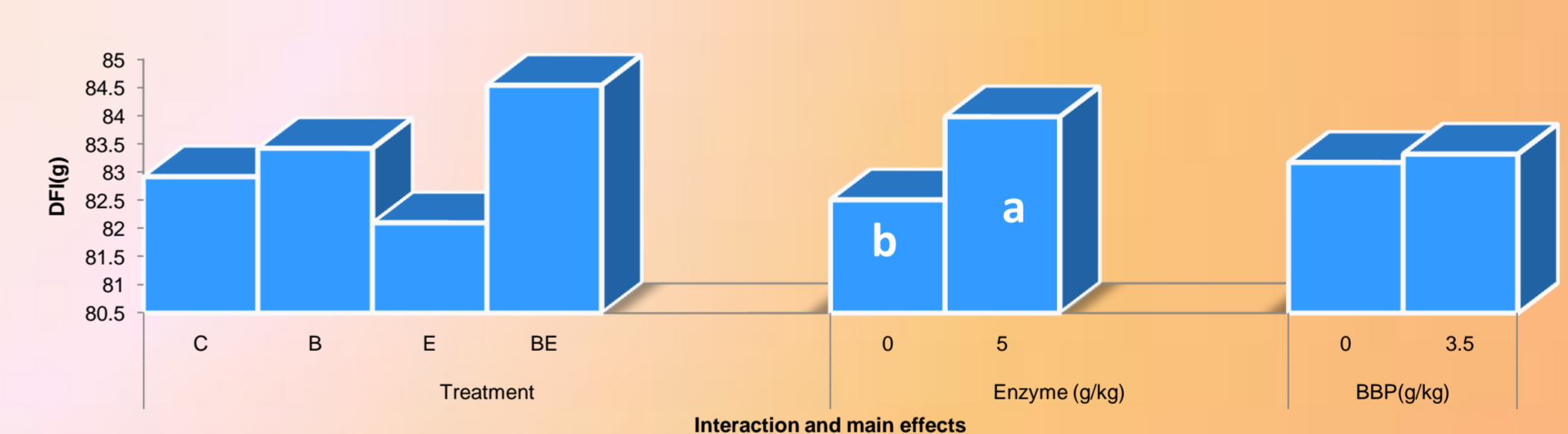
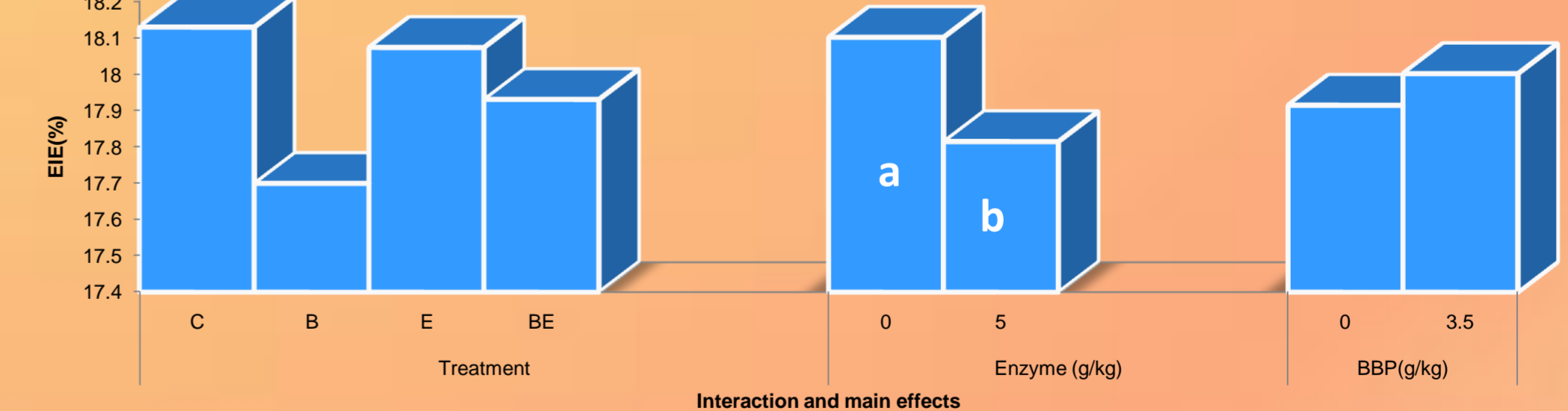


Table 3: Effects of BBP and multi enzyme addition on feed conversion ratio (FCR), energy intake efficiency (EIE) and protein intake efficiency (PIE)

TREATMENT	FCR			EIE			PIE		
	0-3w	3-6w	0-6w	0-3w	3-6w	0-6w	0-3w	3-6w	0-6w
C	1.52	2.02	1.84	22.47	16.46	18.13	3.11	2.62	2.76
B	1.55	2.0	1.86	22.05	16.44	17.70	3.02	2.61	2.71
E	1.53	1.99	1.83	22.30	16.61	18.07	3.10	2.65	2.77
BE	1.48	2.01	1.84	22.94	16.14	17.93	3.18	2.60	2.76
SEM									
P-Value	0.169	0.392	0.736	0.122	0.193	0.311	0.060	0.493	0.333
Main effects									
BBP	Ns	Ns	Ns	Ns	Ns	Ns	Ns	Ns	Ns
CE	Ns	Ns	Ns	Ns	Ns	0.049	Ns	Ns	Ns

Figure 6: Effects of enzyme and BBP on DFI of 0-42 day old broiler chicks



Conclusion

We concluded that diet supplementation only with BBP has no effects on performance and for better results this must be associated with a multi enzyme in broiler diets. Multi enzyme supplementations had some useful effect on performance, feed intake and energy efficiency ratio.

References

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