RESPONSE OF BROILERS TO FEED FORM AND COMPOSITION : 1- PRODUCTIVE PERFORMANCE AND ECONOMIC EFFICIENCY

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SUMMARY

This study was conducted with broiler chickens to investigate the effects of feeding program (P_{1-3}), feed form (S_{1-2}) and their interactions on productive performance and economic efficiency. In total 180 one – day old broiler chicks of the Indian River strain were used in the experimental with 6 treatments, 30 chicks each in 3 replicates of 10 chicks. The study consisted of a completely randomized experimental design with a 3 × 2 factorial arrangement of treatments and three program diets (P_{1-3}), P_1 (24, 23, 21, 20 and 19%) and P_2 (23, 21, 20 and 19%) and P_3 (21, 20 and 19%) crude protein respectively, with two feed forms (S_{1-2}), S_1 (crumbles/pellets) and S_2 (crumbles) diets and their interaction [T_1 (P_1S_1), T_2 (P_1S_2), T_3 (P_2S_1) T_4 (P_2S_2), T_5 (P_3S_1) and T6 (P_3S_2)]. Result of the percent study could be summarized as follow:

1. Broiler chicks feeding on feed program 3 (P_3) reflected the highest significant results in both live body weight (LBW) and body weight gain (BWG) than chicks on the P1-2.
2. Broiler chicks feeding on feed programs P2-3 were significantly less feed consumption (FC) and better energy conversion ratio (ECR), greater performance index (PI) and Eruption production efficiency factor (EPEF) than those on P1 program.
3. Broiler feeding different feed form (S1-2) showed insignificant different in LBW, BWG, FC or feed conversion ratio (FCR).
4. Broiler chicks fed T5 (P3S1) diets reflected the highest LBW and BWG, while the best FCR, Piand EPEF were detected for the chicks fed T3, T5, and T6 diets, respectively.
5. The best economic efficiency value was demonstrated when broiler chicks were fed T5 (P3S1) diets, and the value was 19.0% higher compared to those fed T1 (P1S1) diets.

In conclusion, feeding broiler chicks programs 3 (21%, 20% and 19%) diets, with shape (S1) feed from (crumble/pellet) upholding and reinforcement productive performance and economic efficiency.

Keywords: *performance, economic efficiency, broilers, feed programs and feed forms.*

INTRODUCTION

Today's broilers are generally fed diets which have been through the pelleting process. The pelleting of poultry rations improves weight gain and feed efficiency when compared with unprocessed mash diets. This improvement in performance is partly due to increased feed intake. Birds that are fed pellets also use less energy for feeding; therefore, the energy available for growth is increased (Vukmirović *et al.*, 2017).

Many researchers have reported that broilers fed pellet-based diets have higher weight gain and improved feed conversion compared to those fed mash rations (Chewning *et al.*, 2012), and today pelleting has become a common processing method widely employed by the feed manufacturers to improve farm poultry performance.

Compared with mash feed, pellets enhance bird performance by decreasing feed wastage, alleviating selective feeding, destroying pathogens, improving palatability, and increasing nutrient digestibility. One disadvantage is that pelleting costs about 10% more than producing mash feed (Jahan *et al.,* 2006).

With regards to feed particle size, one traditional view was that a smaller particle size would be associated with a larger surface area of the grain, possibly resulting in higher digestibility in poultry due to a greater interaction with digestive enzymes in the gastrointestinal tract (Preston *et al.,* 2000). In more recent years, however, it is thought that a large particle size aided by some structural components is beneficial to gizzard functions and gut development (Choct, 2009).

Crumble is also a type of feed prepared at the mill by pelleting of the mixed ingredients and then crushing the pellet to a consistency coarser than mash. Recently this form of feed has become popular in broiler production due to its convenience of feeding. (Choi *et al.,* 2016) reported that chicks fed the crumbled starter diet consumed more feed and that chickens on the crumble-pellet dietary regimen were significantly heavier at 42 days when compared with birds fed either all-mash or ground crumble-pellet regimen.

Massuquetto *et al.* (2019) reported that the highest body weight gain of broilers was observed in the crumble group throughout the experimental period, but these data were statistically similar with pellet group from 5 to 8 weeks of age.

Musa *et al.* (2021) reported that chicks grew faster when fed as pellets or crumbles than when the same diets were fed as mash. In accordance with other authors results (Kamboh, 2016; Reshadi-Nejad *et al.*, 2015 and Buchanan *et al.*, 2010) reported that the feeding of pellets, compared to mash, improved broiler growth rate, which was associated with an increased feed intake and improved feed conversion efficiency.

On the other hands, Protein is an essential nutrient for broiler chickens, as it provides the amino acids needed for muscle development, feather growth, immune function, and other physiological processes. However, the protein requirements of broiler chickens vary depending on their age, sex, genotype, environment, and production goals. Therefore, using different feed protein programs can help optimize the growth performance, feed efficiency, carcass quality and profitability of broiler production. (Beski *et al.,* 2015). There are a few different feed protein programs that can be used, and the best program for a particular flock will depend on a few factors, including the age of the birds, the breed of the birds, and the desired production goals.

Generally, broilers that are fed a diet with a top level of protein tend to have a top growth rate than broilers that are fed a diet with a lower level of protein. Also, broilers that are fed a diet with a higher level of protein tend to have a lower feed conversion ratio than broilers that are fed a diet with a lower level of protein (Liu *et al.*, 2021 and Usturoi *et al.*, 2023).

Uzu (1983) and Sklan and Plavnik (2002) talked about the effects of protein levels on body weight in broilers. These studies suggest that a higher protein level in the diet can lead to a higher body weight in broilers. However, it is important to note that the optimal protein level for broilers may vary depending on the breed of bird, the age of the bird, and the desired production goals. It is important to consult with a poultry nutritionist to determine the optimal protein level for a particular flock.

Therefore, in the present study, an experiment was conducted to investigate the effects of programs (P_{1-3}) feed forms (S_{1-2}) and there interaction on productive performance and economic efficiency of broiler chicks.

MATERIALS AND METHODS

The present study was carried out at the Poultry Nutrition Farm and Poultry Feed Quality Control Laboratory, Poultry Production Department, Faculty of Agriculture, Ain Shams University, Shoubra El-Kheima, Qalyobia, Egypt, to investigate the effect of feed shape and feed program and their interactions on broilers performance and economic efficiency till 35 days of age. The current study was performed during the summer period from June till July 2020.

Experimental design:

A total number 180 one day old broiler chicks of Indian River strain were used for the experiment with 6 treatments, 30 chicks each in 3 replicates of ten chicks.

A factorial design "(3 x 2) was used in which three program diets (P_{1-3}), P1 (24%, 23%, 21%, 20%, 19%), P2 (23%, 21%, 20%, 19%) and P3 (21%, 20%, 19%), two feed forms (S_{1-2}), S1 (crumble /pellet) and S2 (crumble) diets and their interaction [T_1 (P_1S_1), T_2 (P_1S_2) T_3 (P_2S_1), T_4 (P_2S_2), T_5 (P_3S_1) and T_6 (P_3S_2)]. Experimental design and chemical composition are presented in Tables (1 and 2).

Productive performance:

All productive traits were determined on a replicate basis which is used to establish means of different treatments. Weights of birds and feeds were recorded by using a digital electronic balance. The average body weight gain (BWG) was calculated per replicate by subtracting the initial body weight of a bird from the final one. The average was obtained by dividing the total weight gain by the number of birds.

Feed conversion ratio (FCR, g feed/g gain) was calculated as the amount of feed consumed, in grams, required to produce out one gram of weight gain. In the same way protein conversion ratio (PCR, g protein/g gain) was calculated as grams of protein intake per grams of weight. Also, energy conversion ratio (ECR, kcal/g gain) was calculated as kilo calories of metabolizable energy intake per grams of weight.

Mortality rate:

Accumulative mortality number was calculated for each treatment by subtracting the number of live birds at the end of the experimental period from the total number at the beginning.

European Production Efficiency Factor (EPEF):

EPEF was calculated according to the following equation:

$$EPEF = [(livability\% \times LBW, Kg)/ (Rearing\ Period, Days \times FCR)] \times 100$$

Economic traits (MR):

The economic evaluation of the product was based on the difference between growth rate and feeding costs. The economic efficiency traits were calculated according to North (1981) in relation to the price of the local market at the exact time of the experiment.

Statistical analyses:

Data obtained in this study were analyzed by two-way analysis of variance using the SAS software general linear model (SAS, 2004) and (Duncan, 1955) as follow:

$$Y_{ij} = \mu + S_i + P_j + (S*P)_{ij} + e_{ijk}$$

Where:

Y_{ijk}: observation
μ: overall mean
S_i: effect of the feed shape
P_j: effect of the feed program
$(S*P)_{ijk}$: interaction between feed shape and feed program
e_{ijk}: random error effect.

RESULTS AND DISCUSSION

Effects of feed programs (p1-3) and feed forms (S1-2) on productive performance of broiler chicks from 1 to 35 day:

Data in Table 3, show the main and treatments values for live body weight (LBW), BWG, feed consumption (FC), FCR, MR, performance index (PI), and EPEF of broiler chicks.

It is worth to note that broiler chicks fed on P3 during experimental period (35 day), reflected the highest significant LBW and BWG compared with those fed on P_1 or P2. On the other hand, broiler chicks fed on shape 1 S1 (crumble-pellet) during experimental periods reflected the highest LBW and BWG compared with those fed on shape 2 S2 (crumble) Concerning the shap effect, the differences failed to be significant during experimented period (35 day). Moreover, the interaction between feed programs and feed form during experimental period (35 day) showed significant different between

treatments (T1-6) and broiler chicks fed T5 (P3S1) diets reflected the highest significant LBW (2.042 kg), and BWG (2.001 kg) while, chicks fed on T1 (P1S1) had the lowest figures being 1.886 kg and 1.845 kg, respectively.

Results presented in Table (3) show that, there were significant differences between broiler chicks fed different programs (P1-3) in FC and FCR during overall period (1-35 day), the corresponding figures were 3,037 kg (P1) vs. 2.852 kg (P2) and 2.894 kg (P3) for FC and 1.598, 1.494 and 1.486 for P1-3for FCR, respectively with significant difference between treatments. In the same order, the figures of FC and FCR indicted insignificant differences between chicks fed different feed form (S1-2) during overall experimental period (1-35 day of age).

The interaction between feed, program (P1-3) and shape (S1-2) in FC and FCR were significant in most cases during experimental period (1-35 day of age). The higher FC was detected for the chicks fed T_2 (P1S2) diets on the other hand the lower FC were found in chicks fed T6 (P3S2) diets. The corresponding figures were 3.128 vs. 2.791(kg), with significant differences between the two treatments and the best FCR was detected for the chicks fed T3 diets (1.456) then T6 diets (1.475) then T5 diets (1.498). On the other hand, the worst FCR were found in chicks fed T2 diets (1.599) then T1 diets (1.596). Besides, the differences between treatments were significant.

Performance index and European production Efficiency Factor:

The obtained results of PI and EPEF in Table (3) show differences between chicks fed different program (P1-3) or shape (S1-2) and the interaction between treatments (T1-6). chicks fed T3 (P2S1) diets reflected the highest PI and EPEF compared with other treatments. However, PI increased by 19% (139.69 vs.116.71) compared with that fed T1 diet and EPEF showed similar trend increased by 15% (363 vs.315), respectively. Chicks fed programs 2 diets (P2) showed the highest PI (128.47) and EPEF (343) while, chicks fed P1 had the lowest figures being 115.73 and 318respectively. In the same order, chicks fed shape 1 (S1) diets showed the highest PI (127.34) and EPEF (343) compared the chicks fed shape 2 (S2) diets being (117.25 and 323), respectively.

In the whole experimental period (1-35day) of age, feeding program 1 (P1) decreased LBW, BWG and increased as figures FC and FCR compared to those of chicks fed programs 2or 3 (P2-P3), respectively. Besides, the differences between treatments were significant these results to disagree with those of Pinchasov *et al.* (1990); Han *et al.* (1992); Canh *et al.* (1998); Ferguson *et al.* (1998) and Aletor *et al.* (2000) who reported this growth performance and carcass synthesis become inferior to those of chicks fed standard high- crude protein (CP). Therefore, it is generally not recommended to lower the dietary CP content by more than about three percentage points (Kornegay and Verstegen 2001 and Lewis, 2001).

Jackson *et al.* (1982); Sklan and Plavnik (2002) and Dairo et al (2010) showed that broilers fed a diet with 22% CP had a higher body weight than broilers fed a diet with 18%. Moreover, feeding diets with (crumble/pellet) shape 1 (S1) increased, LBW, BWG and decreased FC and improved FCR compared to those of chicks fed diets with (crumble) shape2 (S2), however, the differences failed to be significant. These results agree with the finding of Amerah *et al.* (2007a) who reported that bird's performance was similar between birds fed pelleted diets based on fine, medium and coarse grinds and this may be explained by effect of pelleting in evening out the particle size difference.Previous research conducted using pelleted diets have also reported no effect of particle size broiler performance (Svihus *et al.*, 2004 and Amerah and Rapindran, 2009). Moreover, Jahan *et al.* (2006) observed that the highest FC occurred in crumble group in all weeks of age and these dates were statistically similar to pellet group. Amerah *et al.* (2007b) reported that coarse grinding increased the BWG of boilers compared with those fed medium particle size diets. In the whole experimental period (1-35 days of age), the significant interaction between program of feed P1-3 and shape of feed S1-2 indicating that broiler chicks fed and shape of feed T1 (P1S1) T4 (P2S2) and T6 (P3S2 reflected the lowest significant LBW and BWG compared with other dietary treatments. On the other hand, broiler chicks fed T2 (P1S2), T5 (P3S1) and T1 (P1S1), diets reflected the highest FC compared with other treatments. Furthermore, feeding T3, T5 and T6 diets gave the best FCR and highest P1 and EPEF compared with other dietary treatments. These results are in agreement with the finding of Hilliar and Swick, (2018) who found that using low protein diets in poultry feed has been recognized to potentially decrease feeding costs, enhance health and welfare concerns, improves feeding efficiency, improves litter quality and reduces footpad dermatitis (Powell *et al.*, 2008; Shepherd and Fairchild, 2010 and Belloir *et al.*, 2017).

Economic efficiency:

The effect of feed program (P1-3) feed form (S1-2) and treatments (T1-6) on economic efficiency are shown in Table (4).

The results indicate that chickens on the feed programs P3 showed the highest economic efficiency (149.12) while chickens fed P1, or P2 programs diets had the lowest figures being 129.76 and 147.50, respectively. In the same order, chickens fed form 1 (S1) showed the lowest reduction in economic efficiency compared with those fed form 2 (S2) diets and the corresponding values were 136.90 and 147.38, respectively.

On the other hand, feeding broiler chickens on program 3 (P3) with different feed shape (S1-2) gave the highest economic efficiency compared with other programs (P1-2) and the corresponding values were, [156.84 (T5) *vs*. 131.54 (T1) and 151.11 (T3)] for feed form (S1). It is worth to note that broiler chicks fed T5 (P3S1) diets during experimental period (1-35 days of age) reflected the highest economic efficiency and relative economic efficiency compared with other dietary treatments.

CONCLUSION

Finding of this study indicated that, feeding broiler chicks program 3 (21, 20 and 19% CP) with shape1 (crumple/pullet) feed form can achieve maximum productive performance and economic efficiency.

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Table (1): Experimental design and description of different treatments.

Programs (P)	Shapes (S)	Treatments (T)	Crude Protein %	days	Size (mm)	Form
P1	S1	T1	24.00	1-7	1.5	Crumbles
			23.00	8-14	1.5	Crumbles
			21.00	15-21	2.5	Pellets
			20.00	22-28	2.5	Pellets
			19.00	29-35	2.5	Pellets
	S2	T2	24.00	1-7	1.5	Crumbles
			23.00	8-14	1.5	Crumbles
			21.00	15-21	1.5	Crumbles
			20.00	22-28	1.5	Crumbles
			19.00	29-35	1.5	Crumbles
P2	S1	T3	23.00	1-7	1.5	Crumbles
			23.00	8-14	1.5	Crumbles
			21.00	15-21	2.5	Pellets
			20.00	22-28	2.5	Pellets
			19.00	29-35	2.5	Pellets
	S2	T4	23.00	1-7	1.5	Crumbles
			23.00	8-14	1.5	Crumbles
			21.00	15-21	1.5	Crumbles
			20.00	22-28	1.5	Crumbles
			19.00	29-35	1.5	Crumbles
P3	S1	T5	21.00	1-7	1.5	Crumbles
			21.00	8-14	1.5	Crumbles
			20.00	15-21	2.5	Pellets
			20.00	22-28	2.5	Pellets
			19.00	29-35	2.5	Pellets
	S2	T6	21.00	1-7	1.5	Crumbles
			21.00	8-14	1.5	Crumbles
			20.00	15-21	1.5	Crumbles
			20.00	22-28	1.5	Crumbles
			19.00	29-35	1.5	Crumbles

Table (2): Feed ingredients and chemical composition of experimental diets.

Ingredients	Pre-Starter	Starter 1	Starter 2	Grower	Finisher
Yellow Corn	544.17	564.11	621	620.99	636.77
Soybean Meal (46%)	370	365	302	328	297
Corn Gluten Meal (60%)	50	34	36	0	0
Calcium Carbonate	12.6	12	11.98	11.72	12
Mono-Calcium Phosphate	8.6	8.8	11.3	11.14	11.17
Soybean Oil	5	5	5	5	5
Broiler Premix*	3	3	3	3	3
Salt (NaCl)	2.2	2.144	1.1	2.16	2.14
DL – Methionine	1.23	1.5	2.24	2.56	2.7
Sodium Bicarbonate	1.1	1.25	2.3	1	1
Emulsifier &Enzymes**	1.1	1.1	1.1	1.1	1.1
HCL – Lysine	0.5	1.6	2.277	1.48	2.43
Choline Chloride	0.5	0.5	0.5	0.5	0.5
Wheat Bran	0	0	0	11.15	25
Total	1000	1000	999.797	999.8	999.81
Calculated composition					
Crude Protein%	24 24.86	23 23.92	21 21.75	20 20.83	19 19.85
ME (Kcal/Kg diet)	2950 2885	3000 2888	3050 2951	3050 2887	3100 2894
Crude Fiber%	2.738 3.85	2.7 3.84	2.699 3.53	2.704 3.78	2.751 3.75
Lysine%	1.3 1.23	1.3 1.29	1.3 1.19	1.3 1.17	1.3 1.17
Methionine%	0.56 0.52	0.56 0.53	0.56 0.57	0.56 0.57	0.56 0.57
Methionine + Cystine%	0.98 0.92	0.98 0.90	0.98 092	0.98 0.90	0.98 0.89
Calcium%	0.95 0.76	0.95 0.73	0.95 0.75	0.95 0.73	0.95 0.74
AvailablePhosphorus %	0.45 0.33	0.45 0.33	0.45 0.37	0.45 0.37	0.45 0.37
Na	0.13	0.13	0.12	0.13	0.13
Cl	0.18	0.17	0.108	0.17	0.17
Price (LE/Ton)	11057	10891	11594	10500	11400

** Vitamins-Minerals mixture supplied per kg of diet: vit. (A), 12000 I.U., vit. (D3), 5000 I.U; vit. (E), 10 mg; vit. (K3), 2 mg; vit. (B1), 1 mg; vit. (B2), 5 mg; vit. (B6), 1.5 mg; vit. (B12), 10 µg; Biotin, 50 µg; Pantothenic acid, 10 mg; Niacin, 30 mg; Folic acid, 1 mg; Manganese, 60 mg; Zinc, 50 mg; Iron, 30 mg; Copper, 10 mg; Iodine, 1 mg; Selenium, 0.1 mg and Cobalt, 0.1 mg.*

*** Emulsifier, Phytase & Xylanase Enzymes,*

** Calculated analysis chemical according to NRC (1994).*

Table (3): Effects of feed programs (P1-3) and feed forms (S1-2) on productive performance of broiler chicks from 1 to 35 days.

	LBW		BWG	FC	FCR	PI	EPEF
Items	**1 day**	**35 day**	**1-35 days**	**1-35 days**	**1-35 days**	**1-35 days**	**1-35 days**
Feed programs (P1-3)							
Program 1 (P1)	0.041	1.942b	1.901b	3.037a	1.598a	115.73	318
Program 2(P2)	0.041	1.952b	1.911b	2.852b	1.494b	128.47	343
Program 3(P3)	0.041	1.988a	1.947a	2.894b	1.486b	122.69	338
Feed forms (S1-2)							
Shape 1 (S1)	0.041	1.970	1.929	2.923	1.517	127.34	343
Shape 2 (S2)	0.041	1.951	1.910	2.932	1.535	117.25	323
Interaction (T1-6)							
T1 (P1S1)	0.041	1.886c	1.845b	2.946ab	1.596a	116.71	315
T2 (P1S2)	0.040	1.998a	1.957a	3.128a	1.599a	114.75	321
T3 (P2S1)	0.041	1.983a	1.942a	2.827b	1.456b	139.69	363
T4 (P2S2)	0.041	1.920b	1.879b	2.878b	1.532ab	117.25	322
T5 (P3S1)	0.041	2.042a	2.001a	2.997ab	1.498b	125.64	351
T6 (P3S2)	0.041	1.933b	1.892b	2.791b	1.475b	119.74	325
Significancy							
Feed programs	NS	**	*	*	*	؟؟	؟؟
Feed forms	NS	NS	NS	NS	NS	؟؟	؟؟
Interaction	NS	*	**	*	*	؟؟	؟؟

a,c The means values different superscript letters are significantly different (P≤0.05).
LBW = Live body weight, BWG = Body weight gain, FC = Feed consumption, FCR = Feed conversion ratio, PI = Performance index, EPEF = Eruption production efficiency factor.
NS: Not significant

Table (4): Effects of feed programs (P1-3) and feed forms (S1-2) on economic evaluation.

Items	Average feed intake(Kg)	Feed Cost (LE)	Total Cost (LE)#	Total Return (LE) *	Net Return (LE)	Economic Efficiency	Relative Economic Efficiency
Feed programs (P1-3)							
Program 1(P1)	3.04	6.26	18.23	49.48	16.25	129.76	99.00
Program 2(P2)	2.85	6.24	19.11	52.52	18.41	147.50	114.00
Program 3(P3)	2.89	6.20	17.42	50.91	18.49	149.12	116.00
Feed forms (S1-2)							
Shape 1 (S1)	2.92	6.28	18.64	50.85	17.20	136.90	105.00
Shape 2 (S2)	2.93	6.18	17.86	51.09	18.23	147.38	114.00
Interaction (T1-6)							
T1 (P1S1)	2.95	6.33	18.65	49.04	15.39	131.55	100%
T2 (P1S2)	3.13	6.27	19.61	51.95	17.34	138.24	105%
T3 (P2S1)	2.83	6.25	17.67	51.56	18.89	151.11	115%
T4 (P2S2)	2.88	6.19	17.82	49.92	17.11	138.17	105%
T5 (P3S1)	3.00	6.21	18.61	53.09	19.48	156.85	119%
T6 (P3S2)	2.79	6.15	17.17	50.26	18.09	147.10	112%

 # Total cost = (feed cost + price of one-day live chicks + incidental costs);
** According to the local price of Kg sold carcass which was 26.00 L.E.*
Economic efficiency (%) = (Net return LE/total feed cost LE) x 100

استجابة دجاج اللحم لشكل وتركيب العليقة: 1- الاداء الإنتاجي والعائد الاقتصادي

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اجريت تجربة على كتاكيت التسمين لدراسة تاثير برامج التغذية (3 برامج) وشكل العلف (2 شكل مفتت ومكعب) والتداخل بينهم على الاداء الانتاجي والعائد الاقتصادى. استخدمت فى التجربة 180 كتكوت تسمين من سلالة IR غير مجنسة قسمت الى 6 معاملات تجريبية بكل معاملة 3 مكررات وكل مكررة 10 طيور في تجربة عاملية (2×3) بها 3 برامج غذائية (P_{1-3}) حيث غذيت الكتاكيت على البرامج الغذائية التالية

- البرنامج الاول P_1 على عليقة (سوبر بادى 24% , بادى$_1$ 23% , بادى$_2$ 21%, نامي 20% , ناهى 19%) بروتين خام
- البرنامج الثاني P_2 على عليقة (بادى$_1$ 23% , بادى$_2$ 21%, نامي 20% , ناهى 19%) بروتين خام
- البرنامج الثالث P_3 على عليقة (بادى$_1$ 21%, نامي 20% , ناهى 19%) بروتين خام

وقدمت الاعلاف بشكلين (S_{1-2})

- الاول مفتت S_1 (مفتت 1 – 14 يوم) ثم مكعب من (15 – 35 يوم)
- الثانى S_2 (مفتت 1 – 35 يوم)

يمكن تلخيص أهم النتائج المتحصل عليها فيما يلي:

1. أظهرت الطيور المغذاة على البرنامج الثالث (P3) اعلي معدلات وزن حي ووزن جسم مكتسب معنوياً بالمقارنة بتلك المغذاة على البرنامج الأول والثاني (P1-2).
2. استهلاك العلف انخفض معنوياً للكتاكيت المغذاة على البرامج الغذائية الثاني P2 والثالث P3 بالمقارنة بتلك المغذاة على البرنامج الأولP1 مما حسن معامل التحويل الغذائي ودليل الإنتاج والعائد الاقتصادي.
3. شكل العلف (S_{1-2}) لم يؤثر على الوزن الحي والمكتسب واستهلاك العلف ومعامل التحويل الغذائي.
4. سجلت كتاكيت المعاملة T5 (P3S1) اعلى وزن حي بينما اعلى استهلاك علف سجلتة كتاكيت المعاملة الثانية وافضل معامل تحويل غذائي وكفاءة انتاجية سجلته الكتاكيت في المعاملاتT3, T5, T6.
5. سجلت كتاكيت التسمين في المعاملة الخامسة (T5) المغذاه على البرنامج الثالث والشكل الاول اثناء الفترة التجريبية (1-35 يوم) اعلى عائد اقتصادى وكفاءة اقتصادية نسبية بالمقارنه بباقى المعاملات الغذائية.

تغذية كتاكيت التسمين على علائق البرنامج الثالث (بادى$_1$ 23%, نامى 21% , ناهى 19%) والشكل الاول (مفتت/مكعب) اعطى افضل اداء انتاجى وعائد اقتصادي