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THE VALUE OF SOYBEAN MEAL AS THE ONLY PROTEIN CONCENENTRATE IN BROILER FEEDING

(With 3 Table)

By

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استخدام كسب فول الصويا كمركز بروتيني وحيد في تغذية كتاكيت التسمين

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فى محاولة لاستخدام كسب فول الصويا كمركز بروتينى بديلا عن مسحوق السمك فى علائق التسمين لمعرفة امكانية الاستغناء كلية عن البروتين الحيوانى اجريت هذه الدراسه على كتاكيت التسمين (Arber Acre) عمر يوم فى تجربتين الاولى وقسمت فيها الكتاكيت الى عدة مجموعات تم تغذية ثلاثة منها على علائق ذات مستويات مختلفة من مسحوق السمك (٧ ، ٤ ، ٣ ٪) كذلك تم تغذية ثلاثة مجموعات اخرى على الذره وكسب فول الصويا زودت احداهما بكمية اضافية من الفيتامينات (أد٣هـ ، ب المركب) وذلك للمجموعة رقم ٥ أما المجموعة السادسه فقد تمت تغذيتها على عليقة الذره وكسب فول الصويا المعالج بالحرارة تحت ضغط. وفى جميع المحاولات ثبت تفوق العلائق التى احتوت مسحوق السمك على علائق الذره وكسب فول الصويا فقط مع تميز نسبة ال ٤ ٪ مسحوق سمك بأعلى كفاءة تحويل وقد فشل مخلوط الذره وكسب فول الصويا فقط فى تغطية احتياجات النمو وحماية الطائر من الأعراض المرضيه والتى تمثلت فى حالات اضطراب بالأرجل. فى التجربه الثانيه حيث تم استخدام مسحوق السمك بنسبة ٧ ٪ لتغذية الكتاكيت حتى عمر ٧ أسابيع وقورنت بنفس النسبة التى استخدمت فى كل من الأسابيع الأربع خلال فترة التسمين فى التجربه السابقه. وفى المحاوله رقم ٢ حيث تم استخدام مسحوق السمك بنسبة ٧ ٪ لتغذية الكتاكيت حتى عمر ٤ أسابيع لوحظ سرعة معدل النمو مقارنة بنفس النسبه حين تم تغذية الكتاكيت عليها طوال فترة التجربه وقد اثبتت التجربه انه بالرغم من ارتفاع سعر مسحوق السمك الا انه ذات قيمه اقتصاديه لما يمثله من ارتفاع فى معدلات النمو خاصة فى الاسابيع الأولى من العمر.

SUMMARY

Two trials were conducted to study the extent to which the broilers are in need for animal protein. The effect of all plant protein diet (C/SBM) and meai (FM) supplemented-ones was tested in relation to the bird performannce. One day-old Arbor Acre broiler chicks were used in trial 1 to trace the effect of 10 treatments for 7 weeks feeding period. 7, 4 & 2% FM diets, C/SBM with extra vitamins (AD3E & B complex) and corn/autoclaved SBM diets (C/SBM "A") were conducted in a trial and the level of 7% FM was tried to be fed for 1,2,3 & 4 weeks of age and compared with the same level along the whole fattening period in another trial. All FM diets were surpassing the C/SBM diets in stimulating the growth together with increasing the efficieency of feed conversion and the 4% level was the optimal one. The C/SBM diets failed to satisfy the needs for growth and to protect the chicks against nutritional disorders, where leg disorder was appeared in the chicks. However, rapid growth was achieved if the supplementation with the FM was confined to the first 3 or 4 weeks of age. FM diets in spite of being costy, it is proved to be more economic.

INTRODUCTION

Since several decades, poultry rations relied almost totally on meat scraps and fish meal for protein. It became increasingly evident, that animal products, especially fish products, provided some factor (s) in addition to the known B vitamins and methionine which in turn improved the nutritive value for chicks fed a corn-soybean meal diet.

30-50 years ago, there was a great deal of prejudice against plant proteins of all kinds for animal and poultry diets. Early research findings, contributed to the development of high-efficiency poultry rations containing soybean meal as the only source of supplementary protein, have been reviewed by *HAYWARD (1959).*

In many countries, it was obliged (by law) for poultry diet compounders to add a considerable amount of fish meal (as in Germany). However, later on this requirment was steadily decreased, and in diets based on soybean meal, fish meal can be dispensed with.

It was a great surprise that the results were too variable and adverse. Thus in a vast number of experiments, *(WALDROOUP* et l., *1967; WEGNER, 1970; GRIFFITH & SCHEXNAILDER, 1971; HERSTAD, 1973: AVILA & BALLOUN, 1974 and BJORNSTAD* et al., *1974)*, the inclusion of fish meal, in moderate levels, in diets for chicks have created an improved performance which cannot be explained by its content of known nutrients, although others *(FULLER, 1967 and VOGT & STUTE, 1967)* could not be able to demonstrate a similar effect consistly.

This study aimed to solve this problem, at least in Egypt as the local production of fish meal is not able to cover the need and trying to compensate for in diets mainly based on soybean meal. The effect of all plant protein-diet or fish meal-supplemented ones was tested in relation to the bird performance, in different stages, expressed in growth and feed conversion index and cost.

MATERIAL and METHODS

Birds:

215 of the one day-old commercial Arbor Acre broiler chicks were used to trace the effect of 11 treatments in two separate trials for a period extended for 7 weeks of age in each. The chicks were randomly distributed into eleven groups each of 20 chicks of which 6 groups were experimented on in the first trial and other 5 in the second trial of which the control group is only 15 in number.

Diets:

In the first trial three different levels of FM (7,4 and 2%) were tested in groups 1,2 & 3 compared with a C/SBM diet in group 4. In groups 5 & 6 the plant protein diet was tried to be compensated for by the addition of extra vits. (AD3E & B complex) in group 5 and improving the quality of SBM by autoclaving in group 6.

In the second trial the rations fed to the chicks till the age of 7 weeks were supplemented by 7% FM in group 1 and compared with the same level fed for 1,2,3 & 4 weeks of age in the other four groups respectively.

The feeding stuffs corn, SBM & FM in addition to bran, bone meal and limestone were used in formulating the experimental diets after being analyzed for its chemical composition (table 1).

The total amount of feed consumed by each group was weekly recorded where it is divided by the mumber of birds of to

extract the average consumption per bird. The chicks were individually weighed every week in order to follow the body weight development.

The different data were statistically analyzed following the methods cited by *SNEDECOR (1956)*.

RESULTS

As some disease conditions were anticipated in the whole plant groups, the chicks were daily examined for the development of any unthrifty symptoms. It was noted in the first trial that nonspecific leg disorder conditions appeared on all of the C/SBM diet chicks early in age during the first 10 days. On the contrary a level of FM as low as 2% succeeded in protecting against this disorder. The supplementation of the all-plant diet with extravitamins saved 75% of the chicks while autoclaving the soya meal saved only 20% from the C/SBM-birds.

In the second trial, the results indicated that feeding a diet supplemented with 7% FM is needed to protect the chicks from the harmful effect of the whole plant diets and the supplementation should continue for the first two weeks of age from the health - point of view. While, not less than 3 weks are needed if the other performance criteria are considered. Supplementing the diet for only the first week protects 75% of the chicks while while the rest showed the same disease condition noted in trial 1.

Decreasomg the rate pf FM addition from 7% to 4% did not affect the level of feed consumption as it averages in both 3983 g while decreasing the FM level to 2% decreased the consumption by about 1%. The removal of FM supplementation clearly reduced the feed intake by 14.06% and it appeared that the extra vitamins or SBM autoclaving were of no effect in this respect.

Regarding the live weight, there were no significant differences between the groups 1 & 2 (fed the 7 & 4% FM) in trial 1, while in group 3 (2% FM) lesser weight was attained. The growth in the C/SBM group (4) was found to be clearly affected by the absence of the FM factor and the addition of vitamins in group 5 did not improve the growth with the exclusion of the unexpected rise in the 7th week. Autocloving the SBM in group 6 made no difference in the end weight when compared with that of group 4 in spite of the unexplainable increase in rate in the second week.

In trial "2" also supplementing the diets with 7% for the first week or two of age was found to be insufficient for the

growth to be optimal while addition of the animal protein for the first 3 or 4 weeks covered the need for the animal protein factor and the groups 4 & 5 showed an end weight statistically different from that of the first group. FM diets seemed to be more palatable for the chicks than the C/SBM diets as feed consumption was noted to decrease as the chicks were turned form the FM diet to the plant one.

The feed conversion index "FCI" in trial "1" was nearly equal in groups 1 & 2 while in group 3, each bird consumed 300 g more diet to gain 1 Kg. The chicks fed the diets free of FM also consumed more feed than group 1 for every 1 Kg gain (700, 175 & 638 g) for groups 4,5 & 6 respectively.

In the second trial the FCI in groups 4 & 5 compared well with that of group 1 (2.54, 2.56 & 2.52 respectively), while in groups 2 & 3 where the FM addition period was shortened to one or two weeks, the conversion rate was lowered.

DISCUSSION

Trial (1): The results revealed that the fish meal diets were surpassing the corn-soybean meal diets and promoting the growth of broiler chicks, these observations agreed with that of *HERSTAD, 1973; BJORNSTAD* et al., *1974; YAMANE* et al., *1982 and REDDLY & ESHWARIAH, 1989,* however, it could be safely concluded that 4% FM throughout the 7 weeks period supported rapid growth in broilers, the same level was early reported by *CHRISTIANSEN* et al., *1940 and WHITSON* et al., *1945* and can be advised that in case of animal feed-shortage and high costing, a level of FM addition as low as 2% could be trusted with to supply the growth factors. This observed growth response confirms the earlier work of *HEUSER and NORRIS (1944).* Moreover, *HERSTAD, 1978; YAMANE* et al., *1982 and TRAVIN, 1989* reported that 2% FM level was adequate for satisfactory gains.

It is clear that the FM increased the efficiency of feed conversion and its absence increasing the feed intake/Kg gain. This effect in addition to the increase in growth was recorded before by *AVILA & BALLOUN, 1974; HALGA* et al., *1978; VAVAK* et al., *1989; YAMANE* et al., *1982 and RADDLY & ESHWARIAH, 1989,* while no differences were observed in other studies by *WALDROUP* et al., *1965; ROJAS* et al., *1969 DAY & DILWORTH, 1980 and HULAN* et al., *1988.*

Trial (2): As concluded from this trial the FM should be included in the broiler diets during the first three four weeks of age to guard against leg disorders, retarted growth or low feed conversion efficiency, this conclusion comes in line with that of VAVAK et al., *(1980).*

Occurrence of the leg disorders in some chicks fed on C/SBM diets leads to the thinking in the improved nutritional balance provided by the FM to be the main factor protecting the ckicks against the disorders and similar result was reported by *FULLER (1967)*, or on the other hand a certain factor in the SBM harmful for the bone metabolism is neutralized completely by an antifactor in the FM, where this coincides with that recorded by *SUNDE and BIRD (1951) PHEASANT and CARLSON* et al. *(1964)* for turkey poults and confirmed to chicks by *JENSEN and MRAZ (1966)*. As the appearance of these symptoms in a number of chicks but not all, lead to the believe that this effect is subjected to genetical variations in the chicks, an explanation which recently proved by the continuous efforts of geneticists in producing C/SBM strain chicken by feeding a C/SBM ration for a breeding stock over more than 25 generations a fact cited by *PATRICK and SCHAIBLE (1980)*.

The growth promoting effect of FM in addition to palatability, high feed conversion index collectively confirmed the necessity of FM supplementation in the first 3 weeks of age, the period of rapid growth rate and starter feeding. Increasing the length of FM addition has no beneficial effect on performance but on the contrary increasing the cost and negatively affecting the net income. It does not make any difference in cost or performance if the producer uses 7% or 4% FM in his broiler diets.

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Table (1) : chemical composition of the different ingredients used (on dry matter basis)

Feed	Dry matter	crude protein	ether extract	Ash	Crude fiber	Ca	Pav.
				%			
Yellow corn, ground	90.20	9.72	3.45	1.85	1.85	0.03	0.15
Soybean oil meal	92.50	50.20	1.70	6.30	4.30	0.32	0.36
Wheat bran, coarse	92.00	14.50	2.85	6.30	11.40	0.15	0.40
Fish meal, imported	90.70	67.00	6.60	13.50	1.05	3.95	2.50
Bone meal	94.70	2.60	0.18	89.00	0.55	29.80	12.90
Limestone, ground	-	-	-	98.00	-	36.30	-

TABLE (3): The phyical composition and calculated nutrient content of the experimental diets of trial 2.

Feed	Group 1		2			3			4		5	
	7% FM		7% FM	Corn/SBM		7% FM	Corn/SBM		7% FM	Corn/SBM	7% FM	Corn/SBM
	0-3wks	3-7wks	0-1 wks	1-3wks	3-7wks	0-2wks	2-3wks	3-7wks	0-3wks	3-7wks	0-3wks	-4wks 4-7 wks
Yellow corn, ground	67.50	73.65	as in	60.60	72.80	as in	60.00	as that	as in	as that	as in	73.65 as that
Soybean oil meal	18.60	12.66	group	29.25	23.45	group	29.25	of	group	of	group	12.66 of
Wheat bran, coarse	4.28	4.44	1	0.40	0.30	1	0.40	group 2	1	group 2	1	4.44 group 2
Fish meal	7.00	7.00		-	-		-					7.00
Bone meal	0.70	0.42		1.90	1.60		1.90					0.42
Limestone, groud	1.27	1.18		0.90	0.90		0.90					1.18
Common salt	0.40	0.40		0.50	0.50		0.50					0.40
Premix *	0.25	0.25		0.25	0.25		0.25					0.25
DL-methionine	-	-		0.20	0.20		0.20					-
Vit. AD$_3$E O	-	-		-	-		-					-
Vit. B complex O	-	-		-	-		-					-
Kcal ME/Kg diet	2951	3014		2950	3015		2950					3014
Protein %	21.21	18.85		21.21	18.89		21.21					18.85
Calcium %	1.00	0.90		1.00	0.90		1.00					0.90
Phosphorus, AV. %	0.45	0.40		0.45	0.40		0.45					0.40
Methionine %	0.41	0.38		0.54	0.50		0.54					0.38
Lysine %	1.12	0.95		1.90	0.92		1.09					0.95

* Pfizer broiler premix

O Vit. B complex: as that of trial 1

O Vit. AD$_3$E: as that of trial 1.

TABLE (3): The phyical composition and calculated nutrient content of the experimental diets of trial 2.

Feed	Group 1: 7% FM 0-3Wks	Group 1: 7% FM 3-7Wks	Group 2: 7% FM 0-1 Wks	Group 2: Corn/SBM 1-3Wks	Group 2: Corn/SBM 3-7Wks	Group 3: 7% FM 0-2Wks	Group 3: Corn/SBM 2-3Wks	Group 3: Corn/SBM 3-7Wks	Group 4: 7% FM 0-3Wks	Group 4: Corn/SBM 3-7Wks	Group 5: 7% FM 0-3Wks	Group 5: Corn/SBM -4Wks	Group 5: Corn/SBM 4-7 Wks
Yellow corn, ground	67.30	73.65	as in	66.60	72.80	as in	66.00	as that	as in	as that	as in	73.65	as that
Soybean oil meal	16.60	12.66	group	29.25	23.45	group	29.25	of	group	of	group	12.66	of
Wheat bran, coarse	4.26	4.44	1	0.40	0.30	1	0.40	group 2	1	group 2	1	4.44	group 2
Fish meal	7.00	7.00		-	-		-					7.00	
Bone meal	0.70	0.42		1.90	1.60		1.90					0.42	
Limestone, groud	1.27	1.18		0.90	0.90		0.90					1.18	
Common salt	0.40	0.40		0.50	0.50		0.50					0.40	
Premix *	0.25	0.25		0.25	0.25		0.25					0.25	
DL-methionine	-	-		0.20	0.20		0.20					-	
Vit. AD3E O	-	-		-	-		-					-	
Vit. B complex O	-	-		-	-		-					-	
Kcal ME/Kg diet	2951	3014		2950	3015		2950					3014	
Protein %	21.21	18.85		21.21	18.89		21.21					18.85	
Calcium %	1.00	0.90		1.00	0.90		1.00					0.90	
Phosphorus, AV. %	0.45	0.40		0.45	0.40		0.45					0.40	
Methionine %	0.41	0.38		0.54	0.50		0.54					0.38	
Lysine %	1.12	0.95		1.90	0.92		1.09					0.95	

* Pfizer broiler premix

O Vit. B complex: as that of trial 1

O Vit. AD3E: as that of trial 1.