

EFFECT OF FEEDING EXTRUDED HATCHERY WASTE ON THE PERFORMANCE OF SOVIET CHINCHILLA RABBITS.

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ABSTRACT : Seventy five, Soviet Chinchilla 6 week-old rabbits just weaned were divided into 5 treatments, R1, R2, R3, R4 and R5. Each group was further divided into 5 replications of 3 rabbits raised in the same cages and fed with extruded hatchery waste mixed with soja meal (40:60) at 0, 1.5, 3.0, 4.5 or 6% level replacing fish meal from rabbits diet at 0, 25, 50, 75 or 100% level. The body wt. gains were 978, 998, 1030, 899 and 908 g in R1, R2, R3, R4 and R5 treatments, respectively indicating no statistical difference.

The FCR and PER values were 3.79, 3.64, 3.53, 3.71 and 3.46 and 1.641, 1.712, 1.764, 1.674 and 1.798 in R1, R2, R3, R4 and R5 treatments, respectively. There was no statistical difference in the carcass traits between the treatments. The cost of producing 1 kg live wt. gain was lowest (Rs. 14.39) in R5 and highest in R1 (Rs. 16.47) indicating the EHWM incorporation in rabbits diet totally replacing the fish meal is most economical.

RÉSUMÉ : Performances de croissance de lapins "Soviet Chinchilla" nourris avec des déchets extrudés de couvoirs.

Soixante quinze lapins "Soviet Chinchilla", juste sevrés, âgés de 6 semaines ont été répartis en 5 lots, R1, R2, R3, R4 et R5. Chaque groupe a été ensuite divisé en 5 blocs de 3 lapins élevés dans la même cage et nourris avec l'un des 5 aliments contenant 0 - 1,5 - 3,0 - 4,5 ou 6% d'un mélange de déchets de couvoir et de tourteau de soja dans la proportion 40:60 puis extrudé (EHVM). Ce mélange était introduit en remplacement de la farine de poisson de l'aliment témoin à raison de 0, 25, 50, 75 et 100%. En 6 semaines, le gain de

poids vif a été de 978, 998, 1030, 899 et 908g pour les régimes R1 à R5 respectivement, sans différence significative. L'indice de consommation a été de 3,79 - 3,64 - 3,53 - 3,71 et 3,46 et le gain de poids par g de protéines ingérée de 1,641 - 1,712 - 1,764 - 1,674 et 1,798 pour R1 à R5 respectivement. Il n'y a pas de différence statistique entre les caractéristiques de carcasses des différents traitements. Le coût de production pour 1kg de gain de poids vif est le plus bas (14,39 Roupies) pour le lot R5 et le plus élevé pour R1 (16,47 Roupies) montrant que l'incorporation d'EHWM dans l'aliment en remplacement total de la farine de poisson est économique.

INTRODUCTION

The production response of rabbits to rations containing animal meals is controversial (BEYNEN, 1986). Fishmeal is a very good quality animal protein, but recently it is getting prohibitively costly. It is a source of infection particularly of *Salmonella*. Attempts are now being made to substitute it with cheaper and safer feed ingredient. Hatchery waste is one such alternative. It is obtained as incubator residue after the chicks have been pulled out. It consists of : infertile eggs, dead-in-shells, weak and culled chicks, empty shells and male egg type chicks. The eggs contain ideal protein from which a very healthy and vigorous chick is formed, therefore, the residue is also rich in high quality protein and calcium. About 64% of the eggs set produce the chicks and rests are available as waste. In India, 567 million eggs are set every year producing 17406 tonnes dried waste. Since fresh waste is wet and bulky, its transport is difficult and, therefore, disposal at the site is also a problem. The waste decomposes very quickly, it causes pollution also (DHALIWAL, 1995). If it is properly rendered, it can be turned into a very useful feed ingredient, which

can replace the fish meal. It will save about Rs.122 millions annually. It can also be turned eco-friendly.

This study was, therefore, planned to evaluate its suitability in rabbit's rations as a substitute for fish meal.

MATERIAL AND METHODS

Preparation of hatchery waste

The entire incubator reject was collected from Punjab Agricultural University hatchery for a period of four months. The eggs from white Leghorn and broiler parents were set in the incubators, therefore, the rejects were also from both varieties of birds. The incubator rejects consisted of the 1) infertile eggs, 2) dead in shells, 3) weak and culled chicks, 4) empty shells and 5) male chicks from white Leghorn female birds only. The number of eggs set, infertile eggs, dead in shells and empty shells obtained during the collection period is given in Table 1. The rejects were put in hot air oven at 80°C for drying purpose. At this temperature most of bacteria die. The waste was then grinded in a meat grinder to a fine powder. On analysis for N (Kjeldahl method) the sample indicated 35.49% crude protein. The powder (HW) was mixed with soybean flakes in

Table 1 : Number of eggs set.. fertility. hatchability and eggs obtained during 4 months of collection period .

Date of hatch	No. of eggs set	No. of fertile eggs	Fertility (%)	Infertile eggs	Dead in shells	Chicks obtained	Hatchability (%)	Empty shells
White Leghorn parent eggs								
10.3.1993	6279	5210	82.97	1069	1470	3740	71.78	3740
20.3.1993	5441	3010	55.32	2431	500	1200	39.87	1200
30.3.1993	3153	1950	61.85	1203	730	1220	62.56	1220
09.4.1993	3970	2850	71.78	1120	700	2150	75.44	2150
19.4.1993	8444	7195	85.20	1149	685	6510	90.48	6510
29.4.1993	10631	9689	91.13	942	842	8847	91.31	8847
11.5.1993	4909	3981	81.09	928	781	3200	80.38	3200
16.5.1993	1950	1642	84.20	308	977	665	40.49	665
27.5.1993	4526	3381	74.70	1145	2131	1250	36.97	1250
08.6.1993	4062	2544	62.62	1518	1473	1071	42.10	1071
18.6.1993	3914	2817	71.97	1097	1560	1257	44.62	1257
Broiler parent eggs								
05.3.1993	5209	4529	86.94	680	922	3607	79.64	3607
15.3.1993	5445	4473	82.15	972	832	3641	81.40	3641
25.3.1993	4646	3781	81.38	865	881	2900	76.70	2900
04.4.1993	4043	2800	69.25	1193	900	1950	69.64	1950
21.5.1993	4256	3062	71.94	1194	2117	945	30.86	945
31.5.1993	514	148	28.79	366	71	77	52.03	77
28.6.1993	3539	2482	70.13	1057	597	1885	75.95	1885
Total	84931	65594	1313.41	19237	18169	46115	1142.22	46115
Average	4718	3641	72.97	1069	1009	2562	63.46	2562

the ratio of 40:60 so that the crude protein value was raised to 45.59%. This mixture was then extruded at 150°C @ 5.3 kg/minute at 350 psi. It constituted extruded hatchery waste mixture (EHWM). It was examined for bacterial contamination and was found to be negative for both gram +ve and gram -ve organisms.

Preparation of diets .

Wheat, deoiled rice bran, deoiled groundnut cake, soybean flakes, EHWM and fish meal were used for compounding of experimental diets. The chemical and

amino acids composition of the EHWM, deoiled groundnut cake and soybean flakes is given in tables 2 and 3, respectively. The HW replaced the fish meal at 0, 1.5, 3.0, 4.5 and 6.0 % dietary level of 0, 25, 50, 75 and 100% replacement levels. There placement was on iso-proteinic basis. Therefore, the actual dietary levels of HW were 1.68, 3.36, 5.04 or 6.72%. The 5 diets R1, R2, R3, R4 and R5 are given in table 4.

Animals and Housing .

Seventy five, 6-week old rabbits (of similar age)

Table 2: Chemical composition of feed ingredients used in experimental diets (per cent basis)

s. No	Feed ingredients	Dry matter	Crude protein	Ether extract	Crude fibre	Ash	NFE	Calcium
1	Soybean flakes	90.49	52.19	1.47	3.66	5.76	36.92	0.32
2	Fish meal	89.94	40.68	4.58	1.03	20.80	32.91	7.03
3	Deoiled groundnut cake	91.34	40.13	0.83	13.56	7.23	38.25	0.21
4	Extruded hatchery waste mixture	92.16	45.59	4.24	9.19	8.27	32.71	8.39
5	Hatchery waste	94.66	35.49	11.43	6.37	25.40	21.31	20.60

Table 3: Amino acid composition of common protein supplements and hatchery waste used in the experimental diets of Soviet Chinchilla rabbits

Amino acid	Deoiled ground nut cake	Deoiled soybean flake	Fish meal	Hatchery waste	Extruded hatchery waste mixture
Crude protein	42.00	52.19	40.68	35.49	45.59
Arginine	10.47	3.80	0.77	1.70	2.96
Lysine	2.97	3.54	1.69	1.45	2.70
Methionine	0.99	0.88	0.57	0.67	0.79
Cystine	1.47	0.99	0.23	0.39	0.75
Glycine	4.99	2.81	1.29	1.95	2.46
Histidine	2.77	1.51	0.51	0.70	1.18
Isoleucine	4.69	3.13	0.94	1.27	2.38
Leucine	6.94	4.17	1.35	2.16	3.36
Phenylalanine	5.77	2.76	0.74	1.24	2.15
Tyrosine	4.09	2.08	0.74	0.81	1.57
Threonine	3.07	2.03	0.86	1.20	1.69
Tryphophan	1.26	0.73	0.14	0.46	0.62
Valine	5.68	2.76	0.17	1.77	2.36

WISMAN, 1964

just weaned were divided in 5 groups on equal weight basis. Each group was further sub-divided into 5 replications of 3 rabbits. Each replication was reared in a 2668 cm² cage up to the age of 12 weeks.

method of STEEL and TORRIE 1984

Experimental Procedure

Feeding (in a mash form) was done *ad libitum* 4-6 times daily to eliminate the feed wastage. Clean cold water was supplied freely. A record of feed consumed during the week and body weight at the end of each week was kept up to the age of 12 weeks. At the end of experiment, all animals were slaughtered to evaluate for the dressed weight and carcass quality. The data on average voluntary feed intake, liveweight and feed conversion was analysed statistically *as per* the

RESULTS

The data on body weight gains, voluntary feed intake, feed conversion ratio and protein efficiency ratio are presented in table 5. The animals remained in good health and no mortality was encountered during the experimental period. The final body weights varied from 1729±241 in R5 to 1843±261 in R3. The body weight gains were observed to be 978 g on fish meal containing diet (R1), while 899 to 1030 g in the four treatments containing extruded hatchery waste mixture. There was no statistically significant difference between the treatments.

Table 4: Per cent composition and analytical data of experimental diets

Ingredients	Parts per 100 parts				
	R1	R2	R3	R4	R5
Wheat	62.00	62.58	63.15	60.90	58.20
Deoiled Rice bran	20.00	20.00	20.00	20.00	20.00
Deoiled groundnut cake	7.00	3.72	0.45	-	-
Soybean meal	-	2.52	5.04	7.56	10.08
Hatchery waste	-	1.68	3.36	5.04	6.72
Fish meal	6.00	4.50	3.00	1.50	-
*Mineral mixture	5.00	5.00	5.00	5.00	5.00
**Rovi k-g/ctl. feed	25	25	25	25	25
***Rovibe g/ctl feed	25	25	25	25	25
Crude protein %	16.06	16.12	16.19	16.51	17.99
Cost per 100 kg(Rs.)	434.52	421.75	409.03	411.26	415.88

* Each hundred kg contains: Dicalc phosphate - 1.5 kg, Lime stone - 3.0 kg., Common salt - 0.5 kg., Mang sulphate 116 g, Ferrous Sulphate, 7H₂O - 27 g, Copper sulphate, 5H₂O - 0.8g, Zinc oxide - 9.00 g and Pot Iodide - 0.3 g.

** Each g contains Vit. A-82500 IU; D3-12000 ICU; B₂ - 50 mg and K-10 mg.

*** Each g contains vit. B₁ - .4 mg; B₆ - 8 mg; B₁₂ - 40 mcg; Niacin-60 mg; Calc.-Pant-40 mg and Vit. E-40 mg.

Table 5: Effect of feeding hatchery waste on the performance of rabbits from 6-12 weeks of age

Characteristics	R1	R2	R3	R4	R5
Initial body wt. (g)	822	812	813	820	821
Final body wt. (g)	1800 ± 134.63	1810 ± 272.15	1843 ± 260.57	1719 ± 289.95	1729 ± 241.16
Body wt. gain (g)	978	998	1030	899	908
Feed intake/animal (g)	3709	3632	3634	3342	3143
F.C.R.*	3.79	3.64	3.53	3.71	3.46
P.E.R.**	1.641	1.712	1.764	1.674	1.798
Feed cost Rs/kg live weight gain	16.47	15.35	14.44	15.26	14.39

$$* \text{ FCR} = \frac{\text{Feed consumed}}{\text{Body weight gain}}$$

$$** \text{ PER} = \frac{\text{Body wt. gain}}{\text{Protein intake}}$$

The data on feed intake indicated a significant difference ($P \leq 0.05$). The least feed intake of 3142 g was observed in R5 treatment, whereas highest feed intake (3709g) was observed in R1 treatment.

The best feed conversion ratio (FCR) calculated as g feed consumed/g live weight gain, was observed in R5 (3.46) where EHWM replaced the fish meal from the diet completely. The data on carcass evaluation presented in table 6 revealed no statistically significant difference between the treatments.

DISCUSSION

No report on feeding of EHWM in Soviet Chinchilla rabbit has been seen. In this experiment, the feeding of EHWM to Soviet Chinchilla has been found to be satisfactory, indicating that fish meal can be substituted with it in rabbits' diet. DHALI WAL (1995) has reported a satisfactory response in broiler chicken fed EHWM completely replacing the fish meal. The dietary level of EHWM in broiler chicken ration was 10.30% as compared to only 6.72% used in rabbit feed. The data on feed intake indicated that the diet 5 containing 6.72% EHWM is well utilized in the body

of rabbits, better than that containing fish meal in the diet. It is supported by the data as observed for FCR and PER. This is because of high biological value of the egg (99.9%) and ideal amino acids ratio. The feed cost in Rs. per kg of live weight gain was lowest (Rs. 14.39) in R5 in which the fish meal was totally replaced, whereas highest cost was seen in R1 containing fish meal at 6.00% dietary level. Thus EHWM containing rations are cheaper and the feeding of EHWM to Soviet Chinchilla rabbits is economical.

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Table 6: Effect of feeding different levels of hatchery waste on dressed weight in Soviet Chinchilla rabbits at 84 days of age. (Item at 4 to 8 are on hot carcass basis.)

Characteristics	R1	R2	R3	R4	R5
Live wt (g)	1800	1810	1843	1719	1729
Skin wt %	15.57	15.04	17.19	15.92	16.24
Hot carcass %	50.25	47.91	49.09	49.74	49.51
Fore legs %	12.22	14.76	14.59	13.99	13.27
Hind legs %	27.56	26.79	29.24	30.00	30.37
Breast & ribs %	20.66	20.89	21.71	19.67	20.77
Loin and rump %	26.84	26.30	24.74	25.33	23.70
Edible offals %	12.72	11.36	9.72	11.01	11.89