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UTILIZATION OF ORANGE WASTE IN POULTRY FEED

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Sun dried orange waste (O.W.) contained 10.78% protein, 22.34% neutral detergent fibre (NDF) and 44.38% total soluble nutrient (TSN). Upto 12% of the dried material replaced rice polishing from the control feed on protein-caloric equivalent basis. Weight gain of broiler chicken was improved by replacement of dietary rice polishing by dried orange waste. However no significant difference was observed in case of feed intake, feed efficiency and dressing percentage.

Key words: Orange waste, Rice polishing, Poultry feed.

Introduction

Fruit industry in Pakistan is expanding rapidly to meet the requirements of the people. As a result of the processing of the fruits, about 40 - 60% of the weight is left in the form of pulp, rag, seeds and peels as waste materials which are thrown away outside the factory. Due to perishable nature, it ferments quickly and causes fly breeding nuisance, thus creating pollution and disposal problems. These waste materials contain sufficient quantity of nutrients such as proteins, soluble sugars and minerals. Therefore, these materials can be utilized for useful purposes. Many other workers tried to use fruit industry wastes in animal feed during the last few years [1-3]. Therefore, the present work was undertaken to evaluate the use of orange waste in poultry feed.

Materials and Methods

One hundred and twenty day-old broiler (Hubbard strain) chicks were randomly divided into 12 units of 10 birds each.

Feed. Orange waste materials was procured from Shezan factory, Lahore Orange waste material was spread over the cemented floor with 1/2" thick layer under sun. After drying material was ground in hammer mill with 8 mesh size sieve. Orange waste was analysed chemically according to the methods as reported elsewhere [4-6].

Four experimental rations namely A, B, C and D were formulated at PCSIR Lahore Laboratories. Ration A served as control, rations B, C and D contained 4, 8 and 12% dried orange waste respectively (Table 2). All the experimental rations were isocaloric and isonitrogenous.

The chicks were kept on deep litter floor using wheat straw as litter material. Experimental room was cleaned, partitioned into compartments and disinfected before the start of the experiment. The temperature of the experimental room was maintained at 35, 32, 29 and 26° during the first, second, third and fourth week respectively and then mainiained at 23° during the remaining period to 7 weeks.

The experimental rations were fed *ad libitum*. Fresh water was made available to the birds all the times. The data on feed consumption, weight gain, feed efficiency, dressing percentage and weight of internal organs were analysed using analysis of variance technique, and Duncan's Multiple Range Test was applied for the comparison of treatment means (Steel and Torrie) [7].

Results and Discussion

Chemical composition of the dried orange waste (pulp plus peels) is given in Table 1. It is clear from these results that dried orange waste was a potential dietary source of protein and energy. Keeping in view its nutritive value, it was incorporated in broiler's rations replacing rice polishing from a control feed.

Broiler feeding trials

(a) *Weight gain.* Data on weight gain is shown in (Table 3). These findings showed that the chicks gained maximum weight when fed on ration C in which rice polishing was replaced by 8% orange waste. Difference in weight gain of the chicks fed different rations was found to be significant. Duncan Multiple Range Test (DMR) mentioned in Table 4 showed that ration C was highly significantly different from ration A

TABLE 1. CHEMICAL COMPOSITION OF DRIED ORANGE WASTE

	Percentage
Moisture	8.67
Ash	5.53
Crude protein	10.87
Fat	8.97
Crude fibre	9.16
Neutral detergent fibre (NDF)	22.34
Total soluble nutrient	44.38
Total soluble sugar	30.40
Acid detergent fibre (ADF)	17.5

and significantly different from rations B and D (Table 4). Similarly ration D was highly significantly different from rations A and B. Ration B was also significantly different from control ration A. Hence it was concluded that orange waste supplemented feeds were better than the control.

(b) *Feed consumption.* The chicks consumed on an average 4447 gms of feed during 7 weeks (Table 3). Maximum feed consumption was observed in case of chicks fed on ration D followed by those on rations C, B and A. The difference in feed consumption among different groups of birds was, however, non-significant.

Feed efficiency. The feed gain ratios (Table 3) indicated that the birds fed on ration C appeared to be most efficient in the utilization of feed but the difference in the feed efficiency among different groups of chicks was found to be statistically non-significant.

Dressing percentage. The average dressing percentage recorded was 51.75 percent (Table 3). The differences between treatment were found to be non- significant. Similarly weight of liver, heart and gizzard also showed non-significant difference with control ration A.

On the basis of these studies it can be safely concluded that the by-products/wastes of orange processing industry can be beneficially incorporated as a substitute of rice polishing upto 12%.

TABLE 2. COMPOSITION OF EXPERIMENTAL RATIONS.

redient	Rations A Control (%)	B Containing 4% O.W*.	C Containing 8% O.W*.	D Containing 12% O.W*
Maize	15.00	15.00	15.00	15.00
Wheat	15.00	15.00	15.00	15.00
Rice	15.00	15.00	15.00	13.00
Rice polishing	10.00	6.00	2.00	-
Cotton seed meal (decorticated)	10.00	10.00	10.00	10.00
Corn gluten meal(30%)	4.00	4.00	4.00	4.00
Corn gluten meal(60%)	10.00	10.00	10.00	10.00
Rape seed meal	4.00	4.00	4.00	4.00
Orange pulp waste(OPW)	-	4.00	8.00	12.00
Fish meal	10.00	10.00	10.00	10.00
Blood meal	3.00	3.00	3.00	3.00
Molasses	3.00	3.00	3.00	3.00
Bone meal	0.50	0.50	0.50	0.50
Vitamin mineral premix	0.50	0.50	0.50	0.50
Total	100.00	100.00	100.00	100.000
Crude Protein%	23.85	23.90	23.75	23.79
Metabolizeable energy K. Cal/kg.	2949	3053	3053	2994

*O.W. ORANGGE WASTE.

TABLE 3. AVERAGE WEIGHT GAIN, FEED CONSUMPTION, FEED EFFICIENCY, MORTALITY, DRESSING PERCENTAGE AND WEIGHT OF INTERNAL ORGANS OF CHICKS FED ON EXPERIMENTAL RATION.

Particulars	A (Control)	B (4% O.W)	C (8% O.W)	D (12% O.W)
Average total weight** gained (gm/chick)	1334.00	1372.00	1470.50	11404.00
Total feed consumed (gm/chick) 0-7 weeks)	4392.00	4440.00	4467.00	4490.00
Feed : gain g/g	3.21	3.16	2.97	3.15
Mortality %	11.0	10.00	10.00	11.00
Dressing percentage (skin removed)	51.00	53.00	52.00	51.00
Heart weight (gm)	11.60	12.16	11.23	12.00
Liver weight (gm)	46.43	48.00	47.33	49.66
Gizzard weight (gm)	33.00	35.00	33.67	35.33

*Significant at 1% level

TABLE 4. DUNCAN'S MULTIPLE TEST OF WEIGHT GAIN INBROILER

Ration	Mean X	X-1470	X-1404	X-1372	X-1334
A	1334	133.00**	100.00**	64.00**	-
B	1372	69.00*	36.00*	-	-
C	1404	33.00*	-	-	-
D	1470	-	-	-	-

*Significant at 5% levels **Significant at 1% level.

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