Short Communication

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Utilization of Mango Waste in Poultry Feed

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Many waste materials of fruit industry such as pulp, rag, seed and peels are known to be rich in protiens, soluble sugars and minerals. However, these materials may have to be subjected to some suitable treatments before utilization in poultry feed [1-2]. Oltijene *et al.* [3] had tried to use apple pomace, a by product of apple processing industry, as a source of energy in ruminant rations. Anela and Coto[4] evaluated the nutritive value of mango seeds and suggested that these can be incorporated into poultry feed. Therefore, the present studies were conducted to utilize mango industry waste in poultry feed formulation.

160 Days old broiler chicks were randomly divided into 16 units of 10 birds each so as to have two replicates for each experimental ration.

Mango waste materials i.e. peels, stone and mixture of peels and stone (1:1) were procured from Shezan International Food Processing Industries, Lahore. The materials were sun-dried and ground in a hammer Mill to 8 mesh size. These materials were analyzed for moisture, ash, crude protein, crude fiber and cellulose using standard methods [5-7].

Eight isocaloric and iso-nitrogenous, experimental rations, C, P_1, P_2, S_1, S_2, M_1, M_2, and M_3 were formulated by replacing rice polishing with dried mango waste materials (Table 1). The rations and fresh water were supplied *ad libitum* to the chicks through out the experimental period (7 weaks). The data on weight gain, feed consumption and feed efficieny was collected and subjected to statistical analysis as described by Steel and Torrie [8].

The chemical composition of the dried mango waste materials (peels, stone, mixture of peels and stone) is mentioned in Table 2. It is clear from these results that these materials contained 32.21-46.19% neutral detergent fiber, 5.3-7.5% fat and 8.25-15.75% minerals. These materials also contained 12.0-15.75% crude protein, which is almost equivalent to rice polishing.

Average weight gained by the broiler chicks feed on different experimental rations ranged from 1436-1715 gm. (Table 3). Maximum weight was gained by the chicks fed on rations S_1 contaning 4% mango stone. It seems that the better weight gain was due to the presence of well balanced amino acids and fatty acids profile in mango seed kernel as reported by many workers [9,10] . A decrease in weight gain was also observed at higher level of mango stone(8%). Sukhsatej and Kapoor [11] and Makkar *et al.* [12] reported the presence of some toxic substances like tannin and saponin in mango seed kernel which might be responsible for the depressed growth of the chicks in case of ration containing 8% mango stone. Chicks fed on ration P_2 containing 8% mango peels showed almost equivalent weight gain as that of the control ration.

Feed consumption by the chicks fed on ddifferent experimental rations ranged from 4500 - 4730 g. Feed consumption of the chicks fed on rations P_2 and M_2 was almost equivalent to that of the control ration. Poor feed efficiency value was observed with chicks fed on ration containing 4% mixture of stone and peel (M_1). Better feed efficiency value as compared to control was observed with chick fed on ration S_1 containing 4% mango stone (Table 3). Organoleptic evaluation of poultry meat of the chicks fed on different rations containing

TABLE 1. CHEMICAL COMPOSITION OF EXPERIMENTAL RATIONS.

	Control	Mango peel		Mango stone		Mixture(peel and stone)		
		4% P_1	8% P_2	4% S_1	8% S_2	4% M_1	8% M_2	12% M_3
Constants*	90	90	90	90	90	90	90	88
Rice polishing	10	6	2	6	2	6	2	x
Mango peel	x	4	8	x	x	x	x	x
Mango stone	x	x	x	4	8	x	x	x
Mango stone +peel	x	x	x	x	x	4	8	12
Crude protein %	23.20	23.20	23.20	23.20	23.14	23.24	23.28	23.56
M.E.Kcal/kg	2948	2911	2879	2911	2875	2911	2875	2847

* Constants consist of (%), Maize 15; Wheat 20; Rice 15; Cotton seed cake (decorticated) 7; Sesame cake 8; Corn gluten meal (60%) 10; Fish meal 10; Molasses 3; Bone meal 1; Limestone 1; and Vitamin-mineral premix.

TABLE 2. CHEMICAL COMPOSITION OF DIFFERENT FRACTIONS OF DRIED MANGO WASTE.

%*	Mango peel	Mango stone	Mixture(peel & stone) (1:1)
Moisture	10.78	8.90	8.84
Ash (minerals)	8.25	15.75	13.50
Crude protein	12.0	15.75	13.50
Crude fat	5.3	7.5	6.1
Crude fiber	15.96	23.64	18.18
Neutral detergent fiber	32.21	46.19	43.12
Acid detergent fiber	17.34	22.67	21.30
Cellulose	14.87	23.52	21.83
Nitrogen free extract	47.75	33.05	46.08

* Average of three replicates.

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

Particulars	C	P_1	P_2	S_1	S_2	M_1	M_2	M_3
Total weight gained / chick (gm)	1645.00*	1436.00	1661.00*	1715.00**	1594.00	1478.00	1549.00	1652.00*
Total feed consumed/chick(gm)	4700.00	4500.00	4710.00	4600.00	4560.00	4680.00	473.00	4681.00
Feed efficiency	28.85	3.13*	2.83	2.68	2.86	3.16*	3.05*	2.83
Mortality	10.00	5.00	10.00	0.00	5.00	5.00	10.00	10.00
Pressing percentage	58.00	64.00**	61.00	60.00	60.00	66.00**	63.00*	60.00
Heart weight (gm)	10.00	14.00	12.00	15.00	13.00	11.00	11.00	10.00
Liver weight (gm)	43.00	45.00	46.00	45.00	42.00	30.00	45.00	52.00
Gizzard weight (gm)	34.00	29.00	35.00	35.00	33.00	36.00	40.00	38.00

* = Significant at 5% level ; ** = Significant at 1% level.

mango wastes was also carried out. These studies revealed that the quality of the cooked poultry meat (colour, taste, flavour texture) was not affected by the addition of mango waste materials instead of rice polishing in feed.

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

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