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## EFFECT OF DIETARY INCORPORATION OF DRIED TUNA WASTE SILAGE ON NUTRIENT DIGESTIBILITY IN LARGE WHITE YORKSHIRE PIGS

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### ABSTRACT

A feeding experiment was carried out for a period of 104 days on thirty six weaned Large White Yorkshire piglets to find out the effect of dietary incorporation of dried tuna waste silage on nutrient digestibility. Dried tuna waste silage was used to replace dried fish on protein basis at 0, 50 and 100 per cent, in isocaloric and isonitrogenous grower and finisher rations as dietary treatments T1, T2 and T3, respectively. All the animals were maintained on their respective dietary regimen from weaning to an average slaughter weight of 70 kg. A digestibility trial was conducted at the end of the experiment to determine the digestibility of nutrients of the experimental rations by total collection method. The percentage digestibility of dry matter ( $P < 0.01$ ) and crude protein ( $P < 0.05$ ) were lower for the ration T3 than that of T1 and T2. Crude fibre digestibility of ration T2 was higher ( $P < 0.01$ ) than that of T1 and T3 whereas nitrogen free extract digestibility of rations T2 and T3 were higher ( $P < 0.01$ ) than that of ration T1. Ether extract digestibility was similar for the three rations T1, T2 and T3.

**Key words:** Piglets, Dried tuna waste silage, Nutrient digestibility.

### INTRODUCTION

Seafood processing plants generate different kinds of wastes during different stages of processing. Conversion of fish processing waste into fish silage is one of the cheaper alternatives for its utilization as animal feed and to mitigate the protein deficit and environmental pollution in the country. The liquid fish silage blended with filler materials such as cereals, cereal by-products and crop residues can be dried using conventional dryers. Co-dried fish silage has been used as protein supplement in livestock and poultry rations. The present experiment was aimed to study the effect of dried tuna waste silage on nutrient digestibility in Large White Yorkshire pigs.

### MATERIALS AND METHODS

Thirty six, Large White Yorkshire piglets were weaned on 56 days of age and were divided into three groups as uniformly as possible with regard to number, age, sex and body weight. The twelve piglets in each group were distributed into six replicates of two piglets in each replicate. The three groups of animals were randomly allotted to the three dietary treatments T1, T2 and T3, which were made isonitrogenous and isocaloric. Dried tuna waste silage was added to replace crude protein from dried fish at 0, 50 and 100 per cent levels in grower and finisher rations. The animals were maintained on their respective grower rations containing 18 per cent crude protein and 3265 kcal metabolisable energy per kg until

they attained an average body weight of 50 kg and thereafter switched over to finisher rations containing 16 per cent crude protein and 3265 kcal metabolisable energy per kg (NRC, 1998). The piglets in each pen were group-fed twice daily and they were allowed to consume as much feed as they could within a period of one hour.

A digestibility trial was conducted at the end of the experiment to determine the digestibility of nutrients of the experimental rations by total collection method. Before the commencement of the actual collection period, animals were subjected to a preliminary period of three days when they were fed the same quantity of the feed. Faecal matter was collected for three days as and when they were voided, uncontaminated with feed, dirt or urine. Faecal matter collected daily from each animal was weighed and representative samples were taken after thorough mixing. These samples were placed in double lined polythene bags, labelled and kept in deep freezer until further analysis. The representative samples of feed offered and balance feed, if any, were also taken daily during the collection period and were pooled and sub samples were taken for analysis. The faecal samples and feed samples were analyzed for proximate principles (AOAC, 1990).

Data collected on various parameters were statistically analyzed by methods as described by Snedecor and Cochran (1994). Means were compared by Duncan's Multiple Range Test (DMRT).

## RESULTS

Chemical composition of feed and faeces of pigs maintained on different dietary treatments is shown in Tables 1 and 2. Data on percentage digestibility of nutrients of experimental rations T1, T2 and T3 are presented in Table 3. The percentage digestibility of the

three experimental rations T1, T2 and T3 was 77.71, 75.95 and 70.97 for dry matter, 77.58, 77.15 and 73.74 for crude protein, 65.85, 67.95 and 70.87 for ether extract, 38.75, 51.99 and 39.03 for crude fibre and 87.68, 85.55 and 81.86 for nitrogen free extract, respectively.

**Table 1- Chemical composition\* of grower and finisher rations, %**

Parameter	Grower rations			Finisher rations		
	T 1	T 2	T 3	T 1	T 2	T 3
Dry matter	91.35	91.83	92.21	88.00	87.44	87.94
Crude protein	18.20	18.45	18.22	16.39	16.90	16.47
Ether extract	4.56	5.95	7.11	4.26	5.30	6.55
Crude fibre	3.49	4.71	6.47	4.42	5.48	6.65
Total ash	8.03	7.25	6.04	6.72	6.70	6.60
Nitrogen free extract	65.72	63.64	62.16	68.21	65.62	63.73
Acid insoluble ash	3.52	2.90	2.37	3.24	2.27	2.23

\* On dry matter basis

**Table 2- Chemical composition of faecal samples\* of pigs maintained on three dietary treatments**

Parameter	Treatments		
	T1	T2	T3
Dry matter, %	37.61	36.29	36.70
Crude protein, %	16.53	16.14	14.90
Ether extract, %	6.55	7.00	6.65
Crude fibre, %	12.14	10.94	14.05
Total ash, %	27.00	26.34	24.28
Nitrogen free extract,%	37.78	39.58	40.12
Acid insoluble ash, %	18.42	17.09	13.49

\*On DM basis, average of six values

**Table 3- Digestibility of nutrients of three experimental rations, %**

Parameter	Digestibility of experimental rations		
	T1	T2	T3
Dry matter**	77.71 ± 1.72 <sup>a</sup>	75.95 ± 1.84 <sup>a</sup>	70.97 ± 4.30 <sup>b</sup>
Crude protein*	77.58 ± 1.58 <sup>a</sup>	77.15 ± 1.91 <sup>a</sup>	73.74 ± 3.92 <sup>b</sup>
Ether extract	65.85 ± 5.35	67.95 ± 7.11	70.87 ± 4.21
Crude fibre**	38.75 ± 6.41 <sup>a</sup>	51.99 ± 3.85 <sup>b</sup>	39.03 ± 7.28 <sup>a</sup>
Nitrogen free extract**	87.68 ± 1.63 <sup>a</sup>	85.55 ± 0.92 <sup>b</sup>	81.86 ± 2.06 <sup>c</sup>

<sup>1</sup>Mean of six values

a, b, c - Means of different superscripts within the same row differ significantly

\* Significant (P< 0.05), \*\* Significant (P< 0.01)

## DISCUSSION

### DIGESTIBILITY OF NUTRIENTS

#### DRY MATTER

The percentage dry matter digestibility of ration T3 (70.97) was significantly lower (P<0.01) than that of T1 (77.71) and T2 (75.95), but there is no significant difference between rations T1 and T2.

Lower percentage digestibility of dry matter than those obtained in the present study was reported by Phiny and Rodriguez (2001) in Mong Cai pigs fed rations containing sugar palm juice and ensiled fresh water fish. Madhukumar (2002) also recorded lower dry matter

digestibility ranging from 61.2 to 62.4 per cent when different levels of prawn waste was incorporated in the ration of pigs. Sakthivel (2003) obtained dry matter digestibility that ranged from 55.57 to 61.37 per cent when dried cuttle fish waste silage was included at 50 and 100 per cent as the animal protein source instead of unsalted dried fish.

#### CRUDE PROTEIN

Data on digestibility of crude protein indicate significantly lower (P=0.05) percentage digestibility for ration T3 (73.74) when compared to rations T1 (77.58) and T2 (77.15), but there was no significant difference between



rations T1 and T2.

Tibbets *et al.* (1981) and Phiny and Rodriguez (2001) recorded higher crude protein digestibility (80 to 81 and 83.4 to 88.4 per cent, respectively) in pigs fed diets containing different levels of fish silage. Sakthivel (2003) obtained crude protein digestibility that ranged from 62.25 to 64.81 per cent when pigs were fed rations containing two levels of dried cuttle fish waste silage which was lower than those obtained in the present study.

#### **ETHER EXTRACT**

The percentage ether extract digestibility of the three experimental rations T1, T2 and T3 (65.85, 67.95 and 70.87) were statistically similar.

Tibbets *et al.* (1981) obtained ether extract digestibility that ranged from 63 to 64 per cent when different levels of fish silage was incorporated in swine ration. Mohan (1991) reported ether extract digestibility that ranged from 52.9 to 68.2 per cent when different levels of prawn waste was incorporated in the ration of finisher pigs which was similar to those obtained in the present study. However, lower values (40.54 to 49.25 per cent) than those observed in the present study were reported by Sakthivel (2003) when pigs were fed diets containing varying levels of dried cuttle fish waste silage.

#### **CRUDE FIBRE**

Data on percentage crude fibre digestibility presented in the Table 15 indicate significantly higher ( $P < 0.01$ ) digestibility for ration T2 (51.99) as compared to ration T1 (38.75) and T3 (39.03), but there was no significant difference between rations T1 and T3.

Tibbets *et al.* (1981) obtained similar crude fibre digestibility (39 to 45 per cent) in pigs fed rations containing different levels of fish silage. Lower crude fibre digestibility (25.21 to 26.41 per cent) was reported by Mohan (1991) when different levels of prawn waste was incorporated in the rations of swine.

#### **NITROGEN FREE EXTRACT**

The nitrogen free extract digestibility percentage for the three experimental rations T1, T2 and T3 were 87.68, 85.55 and 81.86 per cent, respectively. The three values differed significantly ( $P < 0.01$ ) to each other.

Mohan (1991) and Madhukumar (2002) reported lower nitrogen free extract digestibility (61.8 to 76.1 and 75.5 to 79.6 per cent, respectively) than those obtained in the present study in pigs fed rations containing different levels of prawn waste.

Similar nitrogen free extract digestibility (75.3 to 86.1 per cent) was also reported by Rekha (2001) in pigs fed rations containing 16 per cent crude protein and varying levels of digestible energy in the diet.

#### **CONCLUSIONS**

Even though variations in digestibility of nutrients were observed except for ether extract it did not affected the growth, feed intake and feed conversion efficiency of

the animals. Cost of feed per kg body weight gain of pigs was Rs. 50.84, 46.98 and 45.05 for T1, T2 and T3, respectively. The rations T2 and T3 containing dried tuna waste silage at 50 and 100 per cent replacement of protein from dried fish were economically efficient over ration T1 containing dried fish. It can be concluded that dried tuna waste silage can be used economically as a substitute for dried fish in the ration of growing-finishing pigs on protein basis, without any adverse effect on growth rate, feed conversion efficiency and carcass characteristics.

#### **REFERENCES**

- AOAC. Official Methods of Analysis. Fifteenth edition. Association of Official Analytical Chemists, Washington, D C; 587
- Madhukumar, U. Nutritive evaluation of prawn waste for growth in Large White Yorkshire pigs. MVSc thesis, Kerala Agricultural University, Thrissur, Kerala, India; 2002
- Mohan, P. K. Utilisation of prawn waste as pig feed. MVSc thesis, Kerala Agricultural University, Thrissur, Kerala, India; 1991
- NRC. Nutrient requirement of swine. 10<sup>th</sup> edition, Washington, D C: National Academic Press; 1998
- Phiny C and Rodriguez L. Digestibility and nitrogen retention in Mong Cai pigs fed sugar palm (*Borassus flabillier*) juice and fresh water fish ensiled with rice bran and sugar palm syrup. Liv. Res. Rural Dev. 2001; 13:45- 49
- Sakthivel P C. Utilisation of dried cuttle fish (*Sepia officinalis*) waste silage for growth in crossbred pigs. MVSc thesis, Kerala Agricultural University, Thrissur, Kerala, India; 2003
- Tibbets G W, Seerley R W, McCampbell H C and Vezey S A. An evaluation of an ensiled waste fish product in swine diets. J. Anim. Sci. 1981; 51: 93-100.