The effect of particle size of pelleted copra meal in broiler diets with or without enzymes

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Pelleted and crumbled copra meal (CM) fed as 30% of a mash diet significantly increased the body weight of birds kept for 45 days in comparison to birds fed a 30% unprocessed CM diet (Sundu *et al*., 2005). Two factors appeared to have caused the substantial improvement. Increased bulk density and increased particle size of the crumbled CM enabled a greater feed intake. This experiment examined in more detail the effect of particle size of crumbled copra meal in a mash diet on broiler chicken body weight and the weight of the gastrointestinal tract.

A total of 240–day old male broiler chicks of Ross commercial strain were used and kept for 6 weeks. Six treatments were examined. One diet, formulated to NRC standards, was mixed. It contained maize, soybean, fish meal and pelleted and crumbled 30% CM plus additives. The experimental design was a two way factorial with three particle sizes, two enzyme treatments and four replicates. The particle size treatments were: crumbled copra meal in a mash diet (Coarse); the Coarse diet ground to a fine particle size (Fine); and 50 % Coarse + 50 % Fine (Mixed: see Table 1 for the mean particle sizes). The enzyme supplement used was a combination of Hemicel mannanase® (β–mannanase) and Allzyme SSF® containing cellulase, pentosanase, protease, phytase, β–glucanase, amylase and pectinase. Body weight and feed and water consumption were measured to 42 days. Faeces were collected on days 39–41 for determination of dry matter digestibility. At day 43, two birds from each replication per treatment (total of 48 birds) were randomly selected and weighed. These birds were killed by cervical dislocation and their digestive organs were weighed. Data were analysed by analysis of variance.

Birds fed the Coarse diet had a significantly higher feed intake, body and gizzard weight and lighter intestine ($P<0.05$) than those fed the Fine diet. In agreement with Hamilton *et al.* (1995) the performance of birds fed the Mixed diet was intermediate because the mixed particle sizes and bulk density of this diet had an intermediary effect on feed consumption (Table 1). In concordance with the findings of Bedford *et al*. (1991) there was a significant ($P<0.05$) increase in liveweight gain and relative intestine weight in birds fed enzyme–supplemented diets. No significant interaction between particle size and enzyme supplementation was found.

Bedford, M.R., Classen, H.L. and Campbell, G.L. (1991). The effect of pelleting, salt, and pentosanase on the viscosity of intestinal contents and the performance of broilers fed rye. *Poultry Science* 70, 1571–1577.

Hamilton, R.M.G. and Proudfoot, F.G. (1995). Ingredient particle size and feed texture: effects on the performance of broiler chickens. *Animal Feed Science and Technology* 51, 203–210.

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Table 1 The effect of particle size and enzyme addition in copra meal diets on broilers from 0 – 6 weeks of age.

Parameter	Coarse	Mixed	Fine	With enzymes	Without enzymes
BW (g)	2597.6[a]	2372.3[b]	2130.6[c]	2404[a]	2334.5[b]
Feed intake (g)	3748.7[a]	3562.4[a]	3174.3[b]	3502.5	3487.7
FCR	1.53	1.59	1.59	1.55	1.59
Water intake (g/d)	395.3[a]	376.4[ab]	358.7[b]	380.8	372.8
DM digestibility (%)	69.1	70.8	71.2	70.7	70.1
Intestine (g/100g BW)	1.72[b]	1.94[a]	1.99[a]	1.95[a]	1.81[b]
Gizzard (g)	30.6[a]	30.3[ab]	28.4[b]	29.9	29.6
Gizzard (g/ 100g BW)	1.18[b]	1.24[ab]	1.32[a]	1.24	1.25

Coarse: Crumbled copra meal diet (mean particle size 1.10 mm); Mixed: 50 % Coarse + 50 % Fine (mean particle size of 0.81mm); Fine: Finely ground copra meal diet (mean particle size of 0.63 mm)

[a,b,c] Values in the same row with different superscripts differ significantly ($P<0.05$)