

Unlike the observations of Woodham & Dawson (1968), raw groundnut skins (RGS) had high TIA with a value of 44–47 BAPA units/mg, compared with 10–13 and 60–65 BAPA units/mg for RGF and RSBM respectively. Feeding experiments were carried out with both chicks and rats to assess the effects on their growth of RGS and heated (121°; 4 h) skins (HGS) when added at different levels to a basal toasted soya-bean meal (TSBM) diet. Progressive growth depression and pancreatic hypertrophy were observed with chicks during 2 weeks when RGS were added at 4, 8 and 12% (w/w) levels in a 14% protein TSBM diet. HGS, though still trypsin inhibitory in vitro (16–18 BAPA units/mg) did not adversely affect chick growth.

Diet	Wt gain/ chick (g)	FCE*	Wt of pancreas (g/100 g body-wt)
Basal, TSBM	55	0.32	0.445
Basal, TSBM + 4% RGS	42	0.27	0.488
Basal, TSBM + 8% RGS	28	0.21	0.519
Basal, TSBM + 12% RGS	22	0.18	0.546
Basal, TSBM + 8% HGS	48	0.29	0.469

\*Feed conversion efficiency = wt gain/g feed intake.

The inhibitor components in both RGS and HGS, but not in RSBM, were extractable by ethanol acidified with 1% (v/v) of concentrated HCl. Ethanol-extracted RGS when fed to chicks at a 12% (w/w) level in diets did not produce growth depression or a significant pancreatic hypertrophy, and were thus comparable to HGS. Groundnut skins have a high content of tannin, which is readily extracted with ethanol; since tannic acid has a high TIA, it may be the tannin fraction in the skins rather than a protein that is responsible for the trypsin-inhibitory and growth-depressing activities.

#### REFERENCES

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#### Effects of raw soya-bean and navy-bean meals on germ-free and conventional chicks. By D. HEWITT and M. E. COATES, *National Institute for Research in Dairying, Shinfield, Reading*

Miller & Coates (1966) found that the growth depression due to raw soya-bean meal was less in germ-free than in conventional chicks, whereas the effect on pancreas weight was the same in both environments. We have confirmed this in a series of three experiments where the growth depression was significantly greater in conventional than in germ-free chicks ( $P < 0.05$ ).

We have now investigated the effects of raw and heated navy-bean meal in diets

for germ-free and conventional chicks. The meals were incorporated at a level of 50% in a purified basal diet supplemented with 10% casein, arginine, methionine and glycine. The results for groups of fifteen chicks at 11 days of age were:

	Body-wt (g)		Pancreas weight (g/100 g body-wt)	
	Germ-free	Conventional	Germ-free	Conventional
Raw meal	91	70	0.63	0.72
Heated meal	102	107	0.42	0.47

The growth depression due to raw navy-bean meal was greater in conventional than in germ-free chicks ( $P < 0.001$ ), but the effect on pancreas weights was similar in both environments.

In a 2-week experiment conventional birds were fed the soya-bean and navy-bean diets. The results (numbers in parentheses) were:

	Body-wt (g)		Pancreas weight (g/100 g body-wt)	
	Navy-bean	Soya-bean	Navy-bean	Soya-bean
Raw meal	68 (20)	114 (20)	0.72 (16)	1.13 (10)
Heated meal	139 (19)	140 (20)	0.37 (19)	0.40 (10)

The pancreas weights suggest a lower content of trypsin inhibitor in raw navy-bean meal. It was found that an extract of raw soya-bean meal inhibited over five times as much trypsin as a similar extract of raw navy-bean meal. Extracts of the heated meals had negligible inhibitor activity. It is apparent that growth depression in conventional chicks is not simply related to trypsin inhibitor activity. Either the inhibitors in the two raw meals have different properties or a factor(s) other than the inhibitor is responsible for a large part of the growth depression. This factor appears to be more concentrated in raw navy-bean meal than in raw soya-bean meal.

#### REFERENCE

Miller, W. S. & Coates, M. E. (1966). *Proc. Nutr. Soc.* **25**, iv.

*The Two Hundred and Tenth meeting of The Nutrition Society (Eighty-fourth of the Scottish Group) was held in the Rowett Research Institute, Bucksburn, Aberdeen, on Saturday, 12 April 1969, at 11.30 h, when the following papers were read:*

#### **Hydroxyproline content and cresol-red absorption as protein quality indicators respectively for meat by-products and soya-bean meals.**

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Since the publication of the first progress report of the Agricultural Research Council collaborative group on protein quality tests (Boyne, Carpenter & Woodham,