

## IMPROVING RAW POTATO STARCH DIGESTION IN CHICKENS WITH OAT HULLS

A. M. ROGEL

Raw potato starch is poorly digested by alpha amylases from various animal and microbial sources (Banks and Muir 1980). Digestibility is markedly improved, however, by gelatinisation or mechanical disruption of the starch granules (Naber and Touchburn 1969). The present experiments show that raw potato starch digestion in poultry is also improved when oat hulls are added to the diet.

In the first experiment, seven-week old male broiler chickens were individually housed and fed semi-purified diets containing 0 or 15% potato starch. These diets were diluted with oat hulls at levels of 0, 3, 6, 9, and 12%. The chickens accepted the experimental diets only after an initial force-feeding of about 30 g. During the first six days of the experiment, feed was available from 0700 to 1000 hours and 1900 to 2200 hours. On the final two days, feed was available ad libitum. Excreta was collected during the non-feeding hours of the final three days of meal feeding. At the completion of the experiment, the birds were killed and contents of the lower half of the ileum were collected. Starch digestibility was measured on excreta and ileal contents using celite as a non-digestible marker. As the level of oat hulls in the diet was increased from 0 to 12%, the digestibility of raw potato starch increased linearly from 26.6 to 87.0% in ileal contents and 58.7 to 94.9% in excreta indicating that the improvement occurred primarily in the portion of the intestine above the ileo-caecal junction.

A second experiment was designed to test whether hemicellulose, which makes up about 50% of oat hulls (Rasper 1981), is responsible for the observed improvement in raw potato starch digestion. A crude hemicellulose extract was isolated using 3 M NaOH and fed at levels of 0, 2, 4, and 6% in diets similar to the ones used in experiment one. No improvements in raw potato starch digestion were observed, however, indicating that either intact oat hulls or a fraction removed during hemicellulose isolation is responsible for the favorable effect.

In a third experiment, three-week old broilers were fed ad libitum the basal diets containing 0 and 15% potato starch with or without 10% oat hulls. After three weeks, the gizzard size increased dramatically from 1.46 to 2.89 g/100 g body weight in response to oat hull feeding. The weights and lengths of the small intestines were simultaneously reduced. In addition, a significant increase in the size of filled caeca was observed when raw potato starch was fed, but this effect was overcome by including oat hulls in the diet.

BANKS, W. and MUIR, D. D. (1980). In 'The Biochemistry of Plants', Vol. 3, p.321, ed. J. Preiss.

NABER, E. C. and TOUCHBURN, S. P. (1969). Poult. Sci. 48: 1583.

RASPER, V. F. (1981). In 'Analysis of Dietary Fiber', p. 29, eds W. P. T. James and O. Theander (Marcel Dekker: New York).