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Feeding whole grain wheat to drought affected Angora goats, the influence of roughage on adaptation and estimate of energy requirements for maintenance

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Abstract

This work investigated the feeding of whole grain wheat to goats to determine the requirement if any, for roughage during maintenance feeding; the amount of wheat required to maintain goats; and the health of goats fed whole grain wheat. The experiment used 30 drought affected Angora goats (mean live weight 20.1 ± 0.4 kg) for 23 weeks. Wheat (ME 13.73 MJ/kg DM) or wheat, 800 and chopped hay 200 g/kg (total ration ME 13.22 MJ/kg DM) were fed as sole rations, at maintenance, for 23 weeks and some goats were grazed on drought affected pasture with strategic supplementation of wheat and hay when required. Despite careful introduction of whole wheat, three goats were removed for inappetence.

Only one half of goats adapted to entire wheat diets within 4 weeks. The remaining goats exhibited cycles of rejection of whole wheat and required on average 350 g/kg of hay in order to consume a maintenance diet. Even with a diet notionally of 800 g/kg whole wheat plus 200 g/kg hay some goats required an average intake of 350 g/kg of hay in order to maintain live weight, with the average intake

Abbreviations: ME, metabolizable energy; DM, dry matter; DOM, digestible organic matter; ADF, acid detergent fibre; OMD, organic matter digestibility; DOMD, DOM in the feed DM expressed as a percentage; DMD, dry matter digestibility; DMI, dry matter intake; CP, crude protein; FFLWC, fleece free live weight change; MEI, daily ME intake; ERM, energy retained in mohair; TMEI, total ME intake; S.E.D., standard error of difference between means

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of hay in this treatment being 236 g/kg of dry matter. There was no affect of diet on mohair growth or quality. Plasma Vitamin E concentration was significantly higher for goats grazing pasture than those on wheat, and those with access to hay had significantly higher concentrations than those on wheat only (2.79, 1.02, and 0.67 mg/l respectively; $P<0.001$). The ME requirement for live weight maintenance was 428 kJ/kg$^{0.75}$/d. The energy diverted to mohair growth at maintenance averaged 7.4 kJ ME/kg$^{0.75}$/d. It was concluded that long-term feeding of whole wheat to Angora goats requires the provision of 250 g/kg roughage to ensure adequate energy intake and animal health. When feeding whole grain wheat, managers must adequately protect goats against acidosis, enterotoxaemia and Vitamin E deficiency.

Keywords: Wheat; Adaptation; Roughage; Goats; Maintenance; Energy; Vitamin E; Mohair

1. Introduction

Many goats are kept in environments where droughts are recurring features of climatic variation. In Australia, the majority of farmed goat grazing occurs on grasslands, either improved or native, that exhibit very seasonal patterns of herbage growth (McGregor, 1998). Most of this farmland is also used for cereal grain production, the so called "wheat-sheep zone". Mean annual rainfall in the wheat-sheep zone varies from 400 to 750 mm. Usually growing seasons extend from mid autumn to late spring (commonly 5–8 months) although in northern parts of the wheat-sheep zone summer rainfall predominates.

Williams (1973) did not regard extended periods of absence of rain as drought. The so-called "dry season" of the tropical north and the dry summer conditions referred to above are seasonal droughts at best, as the pasture system remains dormant until the next growing season commences. However few droughts are completely rainless. Droughts have been defined as a "situation where the supply of water falls below critical demand; and as the demand is generally a function of man's activities drought can be considered to be man made" (Gibbs and Maher, 1967). Sturgess (1973) defined drought in a more management orientated way as "any period in which supplementary feeding at a defined level is necessary as a result of adverse seasonal conditions. The severity of the drought is indicated by the quantities of fodder it is necessary to feed, while the length of the drought is the period between the commencement and conclusion of hand-feeding". Sturgess's definition of drought clearly includes seasonal droughts if supplementary feeding was considered necessary as well as the longer-term periodic droughts.

In southern and southwestern Australia and in the wheat-sheep belt, seasonal droughts are usually experienced annually over summer. It has been known for many years that summer pasture residues are deficient in both energy and nitrogen resulting in loss of live weight and declining fibre production of sheep and goats grazing such pastures (McGregor, 1985 unpublished data, 1998). Over a 12–16-week period in the summer, a 25–30% loss of live weight in sheep appears to be normal (McGregor, 1998, 2003).

Cereal grains (oats, barley and wheat) are commonly used as energy supplements for livestock in the wheat-sheep zone during short seasonal droughts. During long-term droughts of 6–18 months it is usual that wheat grain is the cheapest source of energy for supplementary