

An evaluation of the novel feedstuff, grain dust, as a feed for sheep

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Grain dust, arising from the handling of bulk grain, is an example of a novel feedstuff that could have significant economic and environmental importance in Australia. Because it poses both a human health and combustible hazard, grain dust is currently removed by a fan extractor system and then dumped as landfill. This seems wasteful on both economic and environmental grounds. There are however, indications that it could be a useful stock feed because it consists of material from a number of cereal grains commonly fed to animals.

One constraint with feeding novel feeds to livestock is the presence of chemical and/or physical contaminants. The three main sources of chemical and physical contamination of grains used in livestock feeds in Australia are chemical residues, moulds and mycotoxins, and weed seeds (van Barneveld 1999). As grain is often treated with a number of chemicals, there can be significant residues of these in the dust. The aim of this study was to evaluate the potential of the grain dust as an animal feed with respect to the levels of pesticide residues, and whether levels in sheep fed the grain dust would exceed the Maximum Residue Limit (MRL) set for the pesticides.

Twenty mixed-sex, cross-bred sheep, with an average initial weight of 21.3 kg, were fed for eight weeks on either a control diet (lucerne chaff 80%:barley grain 20%) or a treatment diet (lucerne chaff 20%:grain dust pellets 80%), following a two-week acclimatisation period. Sheep were offered increasing total ration amounts throughout the trial (700 g/head/day through to 1200 g/head/day) in order to maintain animal growth. Daily food intakes and weekly liveweights were recorded. Feeds were analysed for the organophosphates, chlorpyrifos methyl, fenotrothion and dichlorvos; the insect growth regulator methoprene; and the synthetic pyrethroid, bioresmethrin. Crude protein (14.69%), gross energy (16.76MJ/kg) and neutral detergent fibre (39.43%) were also determined. At the end of the ten weeks, sheep were slaughtered and renal fat samples were taken for pesticide analysis.

The residue levels for four of the pesticides that were present in this particular batch of grain dust were found not to cause significant residues in the sheep fat. The fifth pesticide, chlorpyrifos methyl, was found to be at a significant level in the treatment sheep ($P = 0.008$), though were still below the MRL of 0.05 mg/kg. The treatment diet (grain dust) also influenced the feed intake of the sheep, with fluctuating eating patterns noted. Fluctuating feed intake suggests that there may be a problem with rumen microbe adaptation to the level of starch in the dust. The feed analysis indicated that grain dust is comparable to cereal grains in terms of energy and protein.

From the feed analyses and the low levels of chemicals detected in the renal fat, it is suggested that grain dust could be a useful feedstuff for livestock. However, further work is needed maintain consistency of product and to ensure MRLs for pesticides would not be exceeded in other batches of dust. If further work did show high pesticide levels unsafe for feed, then it may be possible to adopt some form of chemical treatment, such as alkali treatment of the dust (Desmarchelier and Hogan 1978).

Barneveld, R. van (1999). Physical and chemical contamination in grains used in livestock feeds. *Australian Journal of Agricultural Research* 50, 807–23.

Desmarchelier, J.M. and Hogan, J.P. (1978). Reduction of insecticide residues in grain dust by treatment with alkali. *Australian Journal of Experimental Agriculture and Animal Husbandry* 18, 453–456.