Dags in Sheep Grazing Temperate Pastures: Causes and Consequences of Faecal Adhesion to Wool

Garry C. Waghorn
AgResearch, New Zealand

ID # 10-02

DAGS IN SHEEP GRAZING TEMPERATE PASTURES: CAUSES AND CONSEQUENCES OF FAECAL ADHESION TO WOOL

G.C. Waghorn

AgResearch Grasslands, Private Bag 11008, Palmerston North, New Zealand

Waghorng@agresearch.cri.nz

Abstract

Dags are the accumulation of faeces on wool in the perianal (breech) region of sheep and are a common problem in sheep fed good quality ryegrass based pastures in New Zealand. Their removal, or prevention, is costly but the consequences of doing nothing are severe. There is a high correlation between dags and flystrike (development of maggots) on sheep with dags, and dags reduce fleece value, live-weight gain and reproductive performance. Information summarised here suggests a range of factors contribute to the incidence of dags: lush (high quality) feeds, high voluntary feed intakes, presence of parasites in the gastro-intestinal tract, ingestion of parasite larvae, ingestion of fungal endophyte and a genetic predisposition to loose faeces. Faecal co

elements, dry ground roughage, gums, detergent, serum, lanolin and water and measuring effects on adhesion. Other tests included measurement of faecal form, wool type and diet. Pelleted faeces did not adhere to wool, but interference with faecal form (e.g. mixing faeces) appeared to increase adhesion. It was concluded that faecal form was the most important factor affecting the incidence of dags and although conditions resulting in soft gooey faeces would facilitate their development, the chemical composition of faeces and of pasture were not the principal causes of

dag formation. Factors associated with a high incidence of dags may increase the rate of digesta passage through the large intestine and/or alter intestinal function to affect faecal form and the adhesion of faeces to wool.

Keywords: Sheep, dags, faeces, feces, wool

Introduction

At least half of New Zealand sheep (including lambs) have dags removed at least once a year. New Zealand sheep graze pasture and out of doors all year, and their diet comprises mainly grass, which is usually vegetative (especially in spring and autumn) but dry summers and cool winters can force animals to eat increasing amounts of dead matter close to the ground. Grazing management results in a substantial ingestion of helminth larvae when ewes are lactating and lambs are growing, with a corresponding incidence of dags, but hard grazing in summer can result in consumption of the endophytic fungus *Neotyphodium lolli* which also results in diarrhoea and increased dags. These factors have been documented (Waghorn et al., 1999) but it is important to understand that most faeces passed by sheep do not adhere to wool as dags, and some sheep do not accumulate dags at all, despite others within the flock having a substantial dag burden. This paper describes tests designed to determine factors contributing to the adhesion of faeces to wool, discusses the implications of the findings and summarises the costs of dags to New Zealand agriculture.

Material and Methods

Faeces were collected from sheep grazing pasture and categorised as follows; A, discrete loose pellets: B, pellets formed into stools; C, stools without pellet formation; D, firmish faeces

without a defined form and E, liquid faeces. The adhesion of faecal types to wool were made by creating rectangular (100 x 50mm) wool sections from parallel long fibres (115mm) held together with silastic at each end. These mats were fastened to the outer circumference of a small half-round tube and rocked back and forth on faeces or attached to a small sled and dragged across faeces to replicate either lying in faeces or faeces falling or running across wool from a defecating sheep.

Subsequent to tests of faecal types, the following materials were added (mixed) into faeces either alone or in combination to assess their impact upon adhesion: Water, serum (to mimic some consequences of parasitism), ground particulate Lucerne (*Medicago sativa*) and meadow hay (to replicate a dry roughage diet), roughage constituents (cellulose, hemicellulose), mineral mixtures (to raise faecal ash content), detergent (to affect surface tension properties). Other tests included adhesion of moist faeces to moist, medium and dry faecal material (already adhered to wool), effect to diet on faeces composition and adhesion, effect of urine or lanolin on adhesion and an evaluation of caecal contents on adhesion. Most tests were based on crossbred wool (35 micron) but some fine merino wool (21 micron) was also used in evaluations, as well as long staple wool vs cut ends of wool. Most tests were applied up to 24 times (e.g. rolling wool on faeces 24 times) with 5 replicates of each test.

Results

Pelleted faeces, whether loose or formed into a stool, did not adhere to wool with any test irrespective of how many times the test was applied to a wool mat. Non pelleted faeces, especially faeces without a defined form (not stools) were most adherent to wool, but adding water to pellets or stools to achieve a gooey (type E) consistency resulted in a greater adhesion than could be achieved by natural type E faeces. In other words, interfering with faecal material

by mixing, increased adhesion to wool and cohesion to faeces already adhered to wool. As a consequence, nearly all additions (water, particles, minerals and detergent) increased adhesion of faeces to wool (Table 1) but this appeared to be a consequence of interfering with the surface properties of the faeces rather than the material added. Only addition of serum (30g/100g wet faeces) reduced ($P<0.001$) adhesion to wool. Although the effects of mixing *per se* made it difficult to evaluate specific additives, it was apparent that guar gum and detergent caused a substantial increase in adhesion, as did homogenising faeces (with out additives).

Faeces adhered more strongly to wet than dry faeces and caecal contents were extremely adhesive. Diet had a significant effect on faecal chemical composition, but when soft non pelleted (type D) faeces from sheep fed either *Lotus corniculatus*, Lucerne, white clover (*Trifolium repens*) or ryegrass (*lolium perenne*), all with dry matter contents of 15-20% were tested there were no consistent differences in adhesion. Adhesion to fine wool was not consistently different to crossbred wool.

Discussion

Although the incidence of dags is not directly related to pasture type, the ingestion of *Neotyphodium lolli* endophyte, and presence of larvae from gastro intestinal parasites in grazed horizons will affect the incidence of dags. These factors, in combination with high intakes of lush pastures appear to effect intestinal function and the type of faeces produced. Faeces of sheep fed temperate pastures in New Zealand usually contain 18-35% dry matter (65-82% water) and although water content affects both adhesion and the formation of pellets, it is pelleting that prevents adhesion. Pelleted faeces can have quite low DM contents (23 % DM), but provided they are formed into pellets they will not adhere to wool. Conversely faeces may be produced loose and without form and contain 32% DM. Hence the actual constituents of faecal material do

not appear to have an important role in adhesion of faeces to wool other than by affecting formation of pellets or stools. A rapid passage through the large intestine will reduce opportunities for absorption of water and mineral ions (which will in turn assist in water retention in the digesta).

The implications of parasitism and endophyte on intestinal function need to be tested to determine whether effects are through absorptive capabilities of the intestinal epithelium, caecal function or simply smooth muscle activity facilitating a rapid movement of digesta between terminal ileum and the anus. Once voided, other factors may influence the accumulation and spread of faeces. Obviously tail length is important, but the length of docked tails (5 *vs*.10 cm) have not produced consistent effects on the spread of dags across the breech. Results from tests reported here suggest wool length, urine stain and lanolin will not have major effects on adhesion, and liquid faeces will adhere to any type of wool.

When considering the extent of dag formation, it is important to realise that a substantial faecal accumulation of 400g wet material over two months represents less than 1% of faeces voided. The question of dags could be viewed as "why does only a small proportion of faeces adhere to wool", and short periods of scouring may as important as prolonged periods of loose faeces. Although the mechanisms of dag formation need to be properly researched, the problem is of major significance to sheep farming with high quality ryegrass based pastures, and is made worse by associated effects of flystrike.

References

Waghorn, G.C., Gregory, N.G., Todd, S.E. and Wesselink, R. (1999). Dags in sheep; a look at faeces and reasons for dag formation. Proc. N.Z. Grassland Assn. **61**:43-24.

Heath, A.C.G. and Bishop, D.M. (1999). Flystrike in New Zealand. Surveillance **22**:11-12.

Table 1 - Changes in faecal adhesion to wool in response to additions of material to faeces or modifications to wool. Faeces were not pelleted and had a consistency between stools and diarrhoea.

Test	Effect on adhesion[a]
Additions:	
water	a greater increase in adhesion than expected, perhaps due to physical disruption during mixing.
fibre particles	increased adhesion
cellulose vs hemicellulose	both increased adhesion
mineral elements	inconsistent increases
gums	substantial increase
detergent	increased adhesion
lanolin	no effect
serum	substantial decrease
Wool Type:	
merino vs crossbred	no difference
long fibres vs cut ends	no difference
contrasting feeds	no difference with same faecal type
caecal contents	extremely adhesive

a - No distinction is made between adhesion of faeces to wool and cohesion of faeces to faeces already adherent to wool.

Table 2 - Costs associated with dags to New Zealand farmers. Flystrike costs are included because sheep with dags inevitably become fly struck.

Incident	Cost $ NZ each[a]
Removing dags by shearing the breech: 50% of national flock annually	0.5
Cost of flystrike (5-10% of flock are struck and treated[b]):	
Loss of premium for struck lamb (slow recovery)	10.00
Loss of wool from struck area	0.70
Cost of chemical and labour	1.00
Pelt damage to half of struck animals	3.00
Lamb and ewe deaths, not treated (0.5% of flock)	38.00
Effect of dags due to endophyte, intestinal parasites, feeding and animal susceptibility on:	
Reduced live-weight gain and wool growth	?
Lower lambing percentage if dags not removed	?
Cost of drenching with anthelmintics to reduce effects of dags	1.00
Costs of increasing drench resistance to intestinal parasites	?
Ethical costs of raising sheep knowing that flystrike is inevitable	?
Stress to farmers associated with an inability to control dags, despite requirements for lower chemical inputs into farming	?

a - An average hourly rate for a farm worker is about $11 and lambs are worth about $25-45. $NZ1.00= $US 0.50.

b - Heath and Bishop (1995)