

Using Grazing to Reduce Medusahead Infestations in Utah

Over the last 30 years, behavioral studies at Utah State University focused on understanding how livestock learn about foods. One of our goals was to increase intake of unpalatable forages, if possible. Our research has led to the following principles of diet selection: 1) animal that eat forages early in life with or without their mothers often increase intake of those forages later in life compared to animals without early experiences; e) many unpalatable plants cause food aversions; 2) the correct supplement can increase intake of unpalatable forages; and 4) intake of unpalatable species varies greatly from animal to animal. Our studies to understand and increase intake of medusahead began with these findings in mind.

Before beginning our studies on medusahead we knew the following. Medusahead is mostly stem with a few small leaves, its seedheads have nasty awns, it's high in silica and low in nutrients and it produces a thatch that smothers other plants, doesn't readily breakdown, and is highly flammable.

How much medusahead can sheep eat? Studies at USU were the first to document intake of medusahead by sheep. Medusahead was collected fresh each morning and offered to sheep in individual pens for 6 hours each day. Sheep ate from 6 to 20% of the diet at seedhead emergence, 3 to 6% of the diet of mature medusahead and 10 to 25% of the diet as medusahead thatch (Hamilton et al. 2015).

In pen studies, sheep preferred seedheads (60%) to leaves and stems (40%). Seedheads contained more protein (10.3%) than leaves and stems (7.5%). They also contained lower levels of fiber and higher levels of ash. Ash can be an indication of silica content. These data are contrary to the idea that the awns of medusahead seedheads cause medusahead to be unpalatable (Villalba and Burritt 2015).

Aversion. Many unpalatable plants cause food aversions; they make animals sick. Medusahead does not cause an aversion but we did see a cyclic intake pattern of medusahead, high one day, declining the next. Indicating that silica may be affecting rate of passage through the rumen and affecting the amount of fill in the rumen.

Silica. Inclusion of powdered silica (silica dioxide) into ground alfalfa decreased intake of alfalfa, but did not account for the unpalatability of medusahead (Hamilton et al. 2015). Thus, the structure of silica in the plant and not silica per se likely affects the palatability of medusahead.

Individual Variation. Some sheep ate 20 to 50% more medusahead than others, those that ate more medusahead also ate more silica when added to the diet. Selecting and breeding animals that eat more medusahead may provide a method to use grazing to reduce medusahead infestations using custom devised animals.

Early Experience. As stated earlier, experiences early in life often increase intake of forages later in life. Lambs ate similar amounts of medusahead as their mothers even when foraging alone. However, when medusahead was offered to yearling sheep with and without experience early in life, intake was not affected by early experience. Medusahead intake across days was cyclic with more pronounced intake peaks at the beginning and end of the experiment for inexperienced animals. Experienced sheep had a greater gain-to-feed ratio, and tended to have greater average daily body weight gains and salt intake than inexperienced sheep. On rangeland, the proportion of bites of medusahead by of sheep both experience and inexperienced with medusahead was almost nil, although more medusahead tillers were grazed in pastures with experienced than inexperienced animals (Montes-Sánchez and Villalba. 2017ab).

Supplements. Supplementation did not improve intake of medusahead. In pens, sheep fed either a high protein (29%) or high energy (3.5 Mcal/kg) supplement or a choice of the two did not eat more medusahead than sheep not offered a supplement. Sheep supplemented with propionate, a yeast culture,

or alfalfa also did not increase intake of medusahead (Hamilton et al. 2015, Villalba and Burritt 2015, Montes-Sanchez 2017).

Intake on rangeland

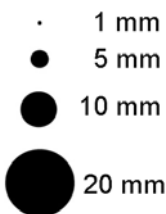
Supplementation does not affect intake of medusahead on rangelands. However, Montes-Sanchez et al. (2017) found that when medusahead was 10% of the plant community, the amount of medusahead in sheep diets was also about 10%. Sheep did not prefer nor avoid medusahead. Thus, proper grazing in areas with low levels of medusahead will not likely increase or decrease medusahead.

Cattle increase intake of medusahead when supplemented with canola meal. However, the cost of the supplement may or may not be feasible depending on the accessibility of the supplement in the region and the benefits achieved by improving the body condition of your cows (Stonecipher et al. 2016).

Cattle grazing pastures inter-seeded with wheatgrasses and forage kochia spent 9% of their time grazing medusahead, 70% grazing other annual grasses, and 20% grazing forbs, wheatgrasses, and forage kochia. In the medusahead-infested plant community, cattle spent 32% of their time grazing medusahead, 66% on other annual grasses and 2% on forbs. Grazing the improved pasture before grazing medusahead-infested plant community did not influence the use of medusahead or other annual grasses. Both groups of cattle spent more than 95% of their time grazing medusahead and other annual grasses (Spackman et al. 2016).

Digestibility of Medusahead. Digestibility of medusahead at different phenological stages (64 to 71% range) was similar to that of tall fescue hay (67%) and greater than digestibility of alfalfa hay (53%). Thus, medusahead is marginal in protein but adequate in energy according to laboratory analysis.

Digestibility is determined by grinding dried plant material through a 1 mm screen. Ground plant material is then incubated in rumen fluid for 24 hours followed by an enzyme solution for another 24 hours. However, ruminants do not chew their food to a 1 mm size at grazing. Furthermore, while total digestibility is a good indicator of nutritional value, it is a poor indicator of preference. Instead, rate of digestibility is a better indication of preference because the quicker a food is digested the sooner nutrients are released and can be detected by the brain.



Medusahead has similar rates of digestibility as tall fescue hay but lower than those of alfalfa. Larger particle sizes (5 to 20 mm) reduced rates of digestibility of medusahead to a greater extent than either alfalfa or tall fescue. It took at least 24 hours before larger particles of medusahead began to break down in rumen fluid. Thus, rates of digestibility and particle size not total digestibility, explain the low intake and palatability of medusahead. The high silica content of medusahead likely decreases the mechanical and enzymatic breakdown of the plant in the rumen, decreasing passage rate and prolonging fill effects in the rumen (Montes-Sánchez and Villalba. 2017a).

References

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