

Effective Fibre

There are several attributes of fibre, or other structural components of the ration which contribute to the overall physical effect, and let's say the required physical effect is to stimulate rumen movement for three reasons:-

- mixing (for uniform pH distribution, and for efficient nutrient exchange between substrate, microbes and rumen wall (villi)),
- regurgitation (gas escape, chewing for particle size reduction and saliva secretion),
- overflow (to transfer the microbial nutrient soup into the abomasum and further digestive tract).

Some of the physical attributes to consider are :

Particle size - large particles cannot escape from the rumen through the orifice into the abomasum. The size of the orifice is relative to the animal size, and this is why sheep can effectively digest whole grains of wheat and barley, while cattle tend to waste them by letting them pass through with their fibre seed coat intact, and thus unavailable for further digestion by the animal. Whole canola seed is too small even for sheep, and whole corn and oats are large enough particles to consider feeding unprocessed to cows. Calves, being smaller than adult cattle, can handle whole grains better than cows. In order to escape from the rumen, the grains need to be reduced in size by chewing. However, are they physically effective enough to efficiently stimulate regurgitation for this purpose ? Do they support prolonged chewing activity ?

Scratchiness - is it a physical irritation, or pointy bits poking the rumen wall, which stimulates the muscle contractions ? Some nutritionists would suggest this and chopping straw increases this attribute by making more ends per total length. Oats are good in this characteristic, being pointy fibre particles. A hard straw versus a soft straw or hay is more effective (this can be best observed when physical fibre is at a low inclusion rate). However, the "rhythmicity" of rumen movement, suggests that there is more than just random poking effects to stimulate the action.

Flotation - best rumen function is achieved when there is a floating mat or "raft" of material. This is where hollow straw provides a great benefit. The upwards pressure translates to an outwards expansion effect, stretching the rumen, keeping up pressure and stimulation.

Entanglement - The floating mat supports other feed particles which may otherwise rapidly sink to the bottom of the rumen. This enhances its presentation for regurgitation, and also for escape from the rumen. While the animal is re-chewing its straw and hay, it is also breaking down the fresh grasses, silage and grain particles. Without coarse roughage, these other ingredients would eventually get chewed anyway, because they can't progress down the tract until they do, but coarse roughage helps to carry it through this process.

These attributes all contribute to the total physical effectiveness of the ration.