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A Greener World Technical Advice Fact Sheet No. 3

Urinary Calculi in Goats

Certified Animal Welfare Approved by A Greener World (AGW) has the most rigorous standards for farm animal welfare currently in use by any organization in North America. Its standards have been developed in collaboration with scientists, veterinarians, researchers and farmers across the globe to maximize practicable, high-welfare farm management.

What are urinary calculi?

Certified Animal Welfare Approved by AGW standards require that the operation to castrate goats is carried out by the time the kid is one week of age. Acceptable methods are banding using rubber rings or use of a Burdizzo or bloodless castrator.

Some goat keepers castrate kids when they are several months old because they are concerned about the risk of urinary calculi – often know as ‘water belly’. The calculi are ‘stones’ formed from phosphorus salts that lodge in the urinary tract and prevent urination. The condition is painful and affected animals will often look hunched up and may strain to urinate. They usually lose their appetite and may kick at their belly. If left untreated the condition can result in death.

If you suspect a goat has urinary calculi you should contact your vet immediately.

What causes urinary calculi?

The primary cause of urinary calculi is an imbalance of phosphorus and calcium in the diet. It is critically important to get the ratio of calcium (Ca) to phosphorus (P) right in the goat’s diet. There must be at least two parts Ca to one part P. As noted above, the calculi are formed of phosphorus salts and feeding too much phosphorus in the diet in relation to the calcium is the most common cause of urinary calculi.

So what feeds cause the problem?

Too much grain or concentrate feed can lead to significant imbalances in the Ca:P ratio, resulting in urinary calculi – which is why goats used for showing are more at risk as they tend to be fed high levels of grain feed. Cereal grains have a Ca:P ratio of around 1:4 or 1:6, so goats that are fed mainly cereal grains will have a Ca:P intake that is well out of

balance. It is also worth looking closely at any mineral supplements you feed to make sure they are not contributing to the problem.

Don't be tempted to feed your goats with products that are designed for other species such as horses, as these may not have the mineral balance that goats need.

Feeding hay and roughage generally helps to minimise the risk of urinary calculi. This is because feeding roughage stimulates saliva production and encourages rumination, both of which lead to phosphorus being safely excreted from the body in the urine. Legume hays, such as clover and alfalfa, also tend to contain more calcium and can help with the balance of minerals; however, it is worth noting that some hay types – such as Bermuda hay – are high in phosphorus.

Other factors that can contribute to high phosphorus levels in forage include whether or not the pasture was fertilized with large quantities of chicken manure when it was growing. The high phosphorus in the manure can lead to higher levels of phosphorus in the plant and then in the hay, although you would have to apply the manure at pretty high levels for it to have this effect.

What about water?

Drinking water is very important to help prevent urinary calculi. If goats aren't drinking enough their urine can become more concentrated and the risk of urinary calculi forming is much greater.

Make sure that goats always have access to clean, fresh water to drink. Some farmers like to add some salt to the goat's diet to make them drink more. You can do this with advice from a vet or nutritionist, but never add salt directly to the water as it will discourage the goats from drinking – and will simply make the problem worse.

In freezing temperatures it may help to provide warm water. Breaking the ice on troughs makes water available, but goats; particularly young goats, may be reluctant to drink it when it's so cold.

Can anything be added to the diet to help?

If you are buying a commercial goat feed you may well find that it already contains a low level of ammonium chloride, which helps to make the urine more acidic to prevent calculi forming.

If you mix your own rations you should get advice from a livestock nutritionist on balancing the mineral content – for example, it may be necessary to add calcium carbonate (ground limestone) to get the right Ca:P ratio. Don't rely on separate free access minerals to balance the diet as you won't know if all the goats are taking sufficient amounts of the mineral – or if they are taking it at all.

So what's the link with early castration?

When goats (or lambs) are castrated their testosterone production stops. Testosterone has an influence on the development of both the penis and the urethra.

When goats are castrated early the urethra is smaller in diameter than the urethra of goats castrated at a later age. Some vets therefore recommend that show goats are not castrated until they are several months old – with the caveat that at this time the operation must be carried out by a vet and the goat must be sedated.

Urinary calculi can occur in entire males but when feeding practices promote calculi then castrated males will be more at risk.

Why do Certified Animal Welfare Approved by AGW standards set age limits on castration?

Although little specific information is available on castration age and welfare in goats, a lot of research has been carried out on this topic for sheep. Regardless of what method of castration is used – or the age of the animal – the procedure will be painful. However, a number of studies have shown that the older the lamb is when it is castrated, the greater the pain involved. For example, Kent *et al* (1999) argue that lambs castrated at 28 or 42 days were more likely to develop inflammation and lesions than lambs castrated a two days of age.

To minimise welfare issues lambs – and hence kids – should be castrated as soon as possible, although only after they have received sufficient colostrum. This usually means that the lamb or kid should be at least 24 hours old before the operation takes place.

The rubber ring is widely recognised as the least painful method of castration. Pain can be reduced if the rubber ring method is combined with the use of the Burdizzo and where smaller bands are used. Mellema *et al* (2006) looked at different methods of bloodless castration and concluded that both rubber rings and Burdizzo clamps could be used in lambs at up to seven days of age, although they recommend that local anaesthetic was also used.

It is worth noting that UK law prohibits the use of rubber ring banding as castration for all kids, lambs or calves older than seven days unless anesthetic is used. Researchers have shown that anesthetic and analgesic are very effective in improving welfare at castration. In the US, however, the very limited number of pain relieving drugs licensed for farm livestock means that it is difficult for farmers buy products that they can use themselves on their own stock for castration and other operations. Certified Animal Welfare Approved by AGW therefore has to work on the best welfare outcome without using anesthetic, which is castration at an early age – hence our standard.

Summary

The key to avoiding urinary calculi is to feed your goats a balanced diet with the correct calcium to phosphorus ratio of at least 2:1. Providing goats with plenty of forage also helps to promote saliva production and rumination – and the excretion of excess phosphorus in the urine. If you are feeding good quality forages you probably don't need to feed a lot of grain to keep your goats healthy and productive.

Finally, you should consider whether or not it is necessary to castrate your goats at all. If you are rearing goats for meat and you slaughter at a young age then there is no taste or texture differential between an entire and a castrated kid – and castration may not actually be necessary.

References

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KEYWORDS

Welfare; castration; goats; urinary calculi; diet