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ORIGINAL PAPER



Iodine deficiency in goats and its prevention and control

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INTRODUCTION

Iodine is an essential micronutrient required to every animal in minute amounts. It is essential for proper functioning of thyroid gland which in turn is important for body's metabolism. An iodine deficiency results in a lack of thyroid hormone production, and the thyroid gland enlarges. The enlarged thyroid gland is called the goitre. It can develop in all domestic mammals, birds and other vertebrates but is a common anomaly reported in goat breeds mainly in endemic areas. Goitre is mainly a disease of kids. Goats have a higher requirement for iodine than other livestock because of their habit of eating the tops of plant called browsing leading to less access to soils iodine. Iodine is necessary for the synthesis of the thyroid hormones thyroxine and triiodothyronine that regulate energy metabolism. About 80–90% of dietary iodine is absorbed and most of the iodine not taken up by the thyroid gland is excreted in urine and milk. Thyroxine has a role in thermoregulation, energy metabolism, fertility and development of new born. Goitre in goats and kids could be of two types primary or secondary goitre. Primary deficiency would be when there is insufficient iodine in the diet. Secondary deficiency is when something is preventing the absorption or utilization of iodine in the body. Congenital goitre has been observed mainly in newborn animals to dams on low iodine intake or failure to get dietary iodine and is of significance due to severe economic losses than in adults. Decreased iodine levels can also result from consuming what may appear to be a proper diet. Iodine can be leached out of feedstuffs grown on sandy soils or the absorption of iodine in the intestines can be decreased by consuming excess calcium or nitrates.

CAUSES

Plants- Iodine deficiency may also be caused by goitrogens- substances within the feed which inhibit the utilisation of dietary iodine. Goitrogens have been detected in some legumes and forage crops including cabbage, broccoli, raw soybeans (most notable), beet pulp, corn, sweet potato, white clover, and millet. Cooking or heating (the usual processing of soybean meal) destroys the goitrogenic substance in these plants. In addition to the goitrogenic substances found in some plants, organochlorides such as DDT, lithium and related compounds may cause goiter. All of the goitrogenic substances act by interfering with production of thyroid hormone.

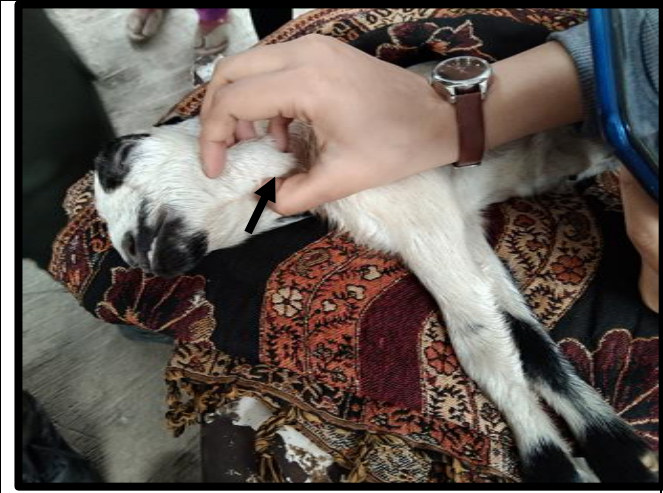

Climate- Goiter may be seen in animals sourced from high rainfall areas where there are iodine deficient soils, with elevated risk often following high rainfall in the autumn or winter.

Soil- Good rains usually result in prolific pasture growth. This tends to lead to the development of goitre by reducing the amount of surface soil eaten by grazing stock. Surface soil, when eaten, acts like a supplement because it contains various minerals including iodine. The amount of soil eaten is also influenced by stocking rates. Goitre is more likely to occur in flocks run at a low stocking rate than in flocks run at a high stocking rate

Others- Goitre may also occur due to excess calcium or nitrates intake that leads to its decreased absorption from intestines.

IODINE DEFICIENCY SYMPTOMS

A goiter in a goat presents as a swollen lump on their neck, just a little below their jaw. While developing a goiter enlarged thyroid gland is the most common symptom of iodine deficiency in goats. Adult animals with iodine deficiency are unthrifty and often infertile. A pregnant goat (doe) that is suffering from iodine deficiency will often have a late-term abortion. If animal is able to keep the kids until full-term, they likely will be stillborn. Alive born kids have a little chance of survival, depending on the level of iodine deficiency. An iodine-deficient kid is often hairless and showing signs of dwarfing, hair loss, skin changes, skeletal malformations and sluggishness and will have a visibly enlarged thyroid gland. The doe may experience a pregnancy problem like retained placenta or pregnancy toxaemia.

	
<p>Picture showing increase the size of thyroid gland (arrow) in 2 days old kid.</p>	<p>Picture showing increase the size of thyroid gland (arrow) in 21 days old goat.</p>

DIAGNOSIS

- Diagnosis of goitre in goats can be done by clinical sign and symptoms.
- Determining the iodine status of an area, iodine levels in soil and pasture.
- Microscopic study of the thyroid is used to confirm the type of goitre present.
- Detection of an enlarged thyroid gland, and a ratio of thyroid weight to body weight greater than 0.4 g/kg, provides an indication of goitre in kids.
- Iodine concentrations in does milk less than 0.8 µmol/L indicate inadequate iodine intake, and have been associated with goitre in kids. Milk iodine assays and thyroxine assays are not provided as a routine diagnostic service, but can be undertaken for special investigations and reliable indicators of the thyroxine status of the animal.
- Newborn kids with adequate iodine nutrition have serum thyroxine concentrations greater than 200 nmol/L.
- Kids aged up to three weeks should have serum thyroxine concentrations greater than their does.

TREATMENT

Treatment of kids with obvious clinical evidence of iodine deficiency is usually not undertaken because of the high case fatality rate. When outbreaks of iodine deficiency occur in neonates, the emphasis is usually on providing additional iodine to the pregnant does. The recommendations for control can be adapted to the treatment of affected animals.

Iodine deficiency is treated or prevented by supplying iodine to the goat, especially the pregnant doe. Iodize salt can be used if iodine-free salt source is not available. Supplemental iodine can be also be fed to the does. Affected kids may be treated with thyroxine preparations or thyroid tablets, drenched with 20 mg of potassium iodide, or injected with 1 ml of an iodised oil preparation. Kids can also be treated with

Levothroxine sodium at the dose rate of 0.1 mg/day orally for up to 2 months. Painting the teats of goats with tincture of iodine or an iodophor teat dip once each day for a fortnight, will allow the suckling young to obtain enough iodine to limit development of most goitres.

PREVENTION

Prevention of goitre in goats and kids can be done by

Managemental practice

If practical, avoid grazing pregnant livestock over 'at risk areas' such as the sandy soil type especially during the latter half of pregnancy. When pasture is lush and plentiful after a good growing season do not run pregnant stock on these pastures at low stocking rates. In good seasons iodine dosing is a wise precaution in known goitre areas. In severely deficient areas, iodised oil injections (1 ml) should be given to pregnant does each year. Routine supplementation and good quality mineral mixture should be established. This supplementation could be by feeding or providing appropriate salt licks.

Iodine dosing

Dosing does with iodine compounds in the 4th and 5th months of pregnancy prevents goitre in their lambs. The iodine compounds can be given directly. Recommended doses are feeding 0.8mg/kg iodine to lactating females and 0.5mg/kg to remaining flock. During pregnancy 130 mg of potassium iodide per week orally can prevent the occurrence of congenital goitre. Some keepers choose to take a more active approach and drench all animals with a solution of 2% potassium iodide at a rate of 10ml per 20kg body weight. The particularly important periods within the breeding cycle are: 4 weeks prior to mating; 6-8 weeks prior to kidding and 2 weeks after kidding.

Salt licks

Iodised salts in feed is sufficient to fulfil the requirement of goats. Salt licks containing 25 g potassium iodate/100 kg of salt are likely to lose much of the iodine by evaporation and leaching. Sodium iodate is more stable in salt mixtures but, as with all licks, not all animals in a herd or flock will use them.

Skin application

For individual animals, such as goats and for small numbers of ewes or sows, tincture of iodine will prevent goitre in the newborn. 1mL tincture iodine can be rubbed on the back of goats once in a week. It should be painted weekly on the soft skin of the inner thigh during the final six weeks of pregnancy.

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