
THERAPEUTIC MANAGEMENT OF CONGENITAL GOITER IN CALF - A CASE REPORT

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ABSTRACT

There are only few case studies on diagnosis, therapeutic management and prevention of congenital goiter in calves. Congenital goiter is characterized enlargement of thyroid gland, stillbirth, abortion, prolonged gestation and birth of weak calves. We report a successful management of congenital goiter with levothyroxine. The condition was tentatively diagnosed by physical examination and confirmed by rapid response to therapeutic intervention indicated by complete recovery within fifteen days. Case of congenital goiter can be effectively managed by levothyroxine treatment, while future occurrences can be prevented by avoiding the feeding of cruciferous plants to pregnant dams and ensuring supplementation with essential minerals.

Keywords: Congenital Goiter, Hypothyroidism, Iodine Deficiency, Levothyroxine, Thyroid Hormones

INTRODUCTION

The enlargement of thyroid gland due to hyperplasia of follicular cells in cattle, called goiter, is caused by persistent stimulation of thyroid stimulating hormone on the follicular cells in response to low serum triiodothyronine (T3) and thyroxine (T4) due to iodine deficiency. (Constable et al., 2016; Micheloud et al., 2019; Zarczynska & Swierczynski, 2023). Calves born with congenital goiter are weak, unable to stand and nurse for several days after birth, stillborn and rarely born with partial or complete alopecia (Constable et al., 2016; Wither, 1997). The cases of goiter were treated with thyroxine (Kashyap et al., 2015), iodized salt (Blowey & Weaver, 2011), or potassium iodide (Constable et al., 2016). We report a case of congenital goiter in a jersey cross calf, successfully managed with oral administration of levothyroxine for fifteen days with clinical response appreciable from fourth day of the treatment.

CASE HISTORY & OBSERVATION

A seven day old female jersey-cross calf presented to District Veterinary Hospital, Punakha, with a history swelling in the upper throat and difficulty in breathing. The owner reported that the newborn calf was healthy and nursed successfully after it was born. The dam was fed turnip without any mineral supplementation during the gestation period.

Physical examination revealed physiological parameters within normal range. However, a non-inflammatory, hard swelling approximately 150 mm in length was palpated caudal to the mandible in the upper throat (figure). This enlarged thyroid gland was observed to exert pressure on the trachea, resulting in tracheal compression and dyspnea.

The condition was diagnosed based on the clinical findings from the physical examination and anatomic location of the swelling. Differential diagnosis excluded other causes of upper neck swelling, including salivary gland disorders and lymph node enlargement.

TREATMENT & DISCUSSION

The condition was tentatively diagnosed as goiter based on clinical sign and the anatomic location of enlargement. The diagnosis can be



Figure 1. Non-inflammatory hard swelling in the upper throat.



Figure 2. Reduction in the size of enlarged thyroid gland on day ten of treatment.



Figure 3. Complete remission of the enlarged thyroid gland.

confirmed by ultrasonographic evaluation of thyroid volume (Aiello et al., 2016). However, confirmation of the case using ultrasonography was not possible due to the unavailability of ultrasonographic examination at our facility. Nevertheless, response to levothyroxine helped us confirm the diagnosis.

Iodide ingested through dietary sources is absorbed into the bloodstream and actively transported into thyroid follicular cells using a co-transporter. Within the follicular lumen, iodide (I^-) is oxidized by thyroid peroxidase to elemental iodine that iodinate tyrosine residues on thyroglobulin. This process generates monoiodotyrosine and diiodotyrosine, which are joined by thyroid peroxidase to synthesize triiodotyronine (T3) and thyroxine (T4). Thiouracils found in cruciferous plants (e.g., turnips), inhibit thyroid hormone synthesis by competitively binding thyroid peroxidase (Reece et al., 2015). In our case, the dam was fed turnip without any mineral supplementation during the gestation period which could be the cause of congenital goiter in the calf.

The calf was treated with $40 \mu\text{g kg}^{-1}$ levothyroxine, orally, once daily for 15 days; however, due to the absence of specific isotopic kinetic or pharmacokinetic studies on thyroxine production, degradation, or oral bioavailability in cattle, this dosing regimen was directly adopted from the pharmacological dose established in dogs (Riviere & Papich, 2018). Levothyroxine was found effective against goiter in calves when compared to both iodized salt and tincture iodine (Kashyap et al., 2015); however this clinical trial was conducted with a small sample size ($n=3$). The enlarged

thyroid began to decrease in size within ten days of levothyroxine administration (figure 2), with complete regression observed by day fifteen in our case (figure 3). Clinical response was observed by day fifteen with complete recovery by twenty-two to twenty-five days in a clinical study conducted (Kashyap et al., 2015).

Goiter-associated perinatal mortality rate ranging from 15.8% to 25% was documented in a case report. In this case, the affected calves were either born dead or died between few minutes and several hours after birth; those born alive presented with dyspnea, reduction of suckling response and inability to stand (Micheloud et al., 2019).

Hypothyroidism in ruminants is characterized by reproductive disorder such as infertility, prolonged gestation, abortions, stillbirths, and increased perinatal mortality (Micheloud et al., 2019). Therefore, dietary intake of 0.8 to 1.2 mg kg^{-1} dry matter of feed iodine is recommended for lactating and pregnant cow to prevent outbreak of iodine deficiency in neonates (Constable et al., 2016). We advised the owner to discontinue feeding cruciferous plants to pregnant animals; instead recommended supplementation with iodized salt and mineral mixture containing selenium and other essential trace minerals for optimal thyroid function and fetal development.

Congenital goiter can be effectively managed with levothyroxine therapy. Additionally, the prevention of future cases can be achieved by eliminating the feeding of cruciferous plants and ensuring adequate supplementation with essential minerals.

SUMMARY

This case report describes the successful therapeutic management of congenital goiter in a seven-day-old jersey-cross calf. Diagnosis was based on physical examination and rapid clinical improvement following oral levothyroxine treatment (40 µg kg⁻¹ daily for 15 days). The calf showed marked recovery within fifteen days. Prevention strategies include avoiding cruciferous plants during gestation period and supplementing essential minerals like iodine and selenium to ensure proper thyroid function and fetal development.

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