Case Report

THERAPEUTIC MANAGEMENT OF CONGENITAL GOITER IN A CALF- A CASE REPORT

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ABSTRACT

Congenital goiter is characterized by enlargement of thyroid gland, stillbirth, abortion, prolonged gestation and birth of weak calves. This case report documents the successful management of a congenital goiter using levothyroxine. The condition was tentatively diagnosed based on clinical signs and confirmed by rapid therapeutic response, with complete recovery observed in fifteen days. To prevent future cases, it is recommended to avoid feeding cruciferous plants to pregnant dams and to ensure adequate supplementation of iodine during gestation in iodine deficient areas. .

Key words: congenital goiter, hypothyroidism, iodine deficiency, levothyroxine, thyroid hormones

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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*., 2017, Micheloud *et al.,* 2019, Zarczynska and 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., 2017, Wither, 1997). The cases of goiter were treated with thyroxine(Kashyap *et al*., 2015), iodized salt (Blowey and Weaver, 2011), or potassium iodide (Constable *et al.,* 2017). We report a case of congenital goiter in a jersey crossbred calf, successfully managed with oral administration of levothyroxine for fifteen days with clinical response appreciable from the fourth day of the treatment.

CASE HISTORY AND OBSERVATION

A seven day old female jersey crossbreed calf was presented to District Veterinary Hospital, Punakha, with a history of swelling in the upper neck and difficulty in breathing. The owner reported that

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the newborn calf was healthy and nursed successfully at birth. 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 neck as shown in Figure 1. This enlarged swelling was observed to exert pressure on the trachea, resulting in tracheal compression and dyspnoea.

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 AND DISCUSSION

The signs of goiter in calves include enlargement of thyroid gland evident by large swelling in laryngeal area, weakness, partial alopecia, stillbirth and shallow breathing with concurrent chondrodystropy (Homerosky *et al.,* 2019). Our case was congenital goiter with enlarged thyroid gland without concurrent skeletal defects.

The condition was tentatively diagnosed as goiter based on clinical sign and the anatomic location of enlargement. The diagnosis can be confirmed by ultrasonographic evaluation of thyroid volume (Aiello *et al*., 2016). Thyroid ultrasound is a non-invasive and cost-effective method for examining thyroid gland in cattle, providing both morphological and functional insights (Eppe *et al.*, 2024). 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 turnips without any mineral supplementation during the gestation period which could be the cause of congenital goiter in the calf.

The calf was treated with levothyroxine at dose rate of 40 µg/kg, 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 and Papich, 2018).

Levothyroxine is a synthetic thyroid hormone replacer, which provides an immediate source of T4 that a growing calf cannot synthesize when there is iodine deficiency (Riviere and Papich, 2018). Levothyroxine was found effective against goiter in calves when compared to both iodized salt and tincture iodine (Kashyap *et al*., 2015). The enlarged thyroid began to decrease in size within ten days of levothyroxine administration as shown in Figure 2., with complete regression observed by day fifteen in our case.

Goiter-associated perinatal mortality rate ranging from 15.8% to 25 % was documented in a case study. 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 iodine intake of 0.8 to 1.2 mg/kg dry matter of feed is recommended for lactating and pregnant cows to prevent outbreak of iodine deficiency (Constable *et al*., 2017). 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.

CONCLUSION

This case report describes the successful therapeutic management of congenital goiter in a seven-day-old jerseycrossbred calf. Diagnosis was based on physical examination and rapid clinical improvement following oral levothyroxine treatment (40 µg/kg 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.

Fig.1. Non-inflammatory hard swelling in the upper neck.

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

REFERENCE

Aiello, S.E., Moses, M.A. and Allen, D.G. (2016). The Merck Veterinary Manual, Merck and Company, Incorporated White Station, NJ, USA.

Blowey, R. and Weaver, A.D. (2011). Color atlas of diseases and disorders of cattle. *Elsevier Health Sciences*, **26**. https://doi.org/10.1016/B978-0-7234-3602-7.00008-X.

Constable, P.D., Hinchcliff, K.W., Done, S.H. and Grünberg, W. (2017). A Textbook of the Diseases of Cattle, Horses, Sheep, Pigs, and Goats. 11 edition.*Veterinary Medicine*, 1742-1747. https://doi.org/10.1016/B978-0-7020-5246-0.00027-9.

Eppe, J., Raguet, E., Petrossians, P., Czaplicki, S., Bayrou, C., Rollin, F., Toppets, V. and Guyot, H. (2024). From ultrasound to microscopy: actualities in thyroid investigation in cattle. *PLoS One*, **19**(5): e0302997. https://doi:10.1371/journal.pone.0302997

Homerosky, E.R., Johnsen, M., Steinmann, M., Matejka, C. and Jelinski, M.J. (2019). An outbreak of congenital goiter and chondrodystrophy among calves born to spring-calving beef cows. *The Canadian Veterinary Journal*, **60:** 981.

Kashyap, D.K., Giri, D.K. and Dewangan, G. (2015). Therapeutic management of goiter in calves. *Intas Polivet*, **16:** 88-90.

Micheloud, J.F., Olmos, L.H., García, J.A., Mattioli, G.A. and Uzal, F.A. (2019). Perinatal mortality in cattle associated with goitre. *Brazilian Journal of Veterinary Pathology*, **12**(2): 48-52. http://doi: 10.24070/bjvp.1983-0246.v12i2p48-52

Reece, W.O., Erickson, H.H., Goff, J P. and Uemura, E.E. (2015). Dukes' physiology of domestic animals, *John Wiley and Sons*. 13th Edition.

Riviere, J.E. and Papich, M.G. (2018). Veterinary Pharmacology and Therapeutics. 10th ed.: John Wiley and Sons, 708-711.

Wither, S.E. (1997). Congenital goiter in cattle. *The Canadian Veterinary Journal*, **38**: 178.

Zarczynska, K. and Swierczynski, G. (2023). Iodine in cattle-review. J*ournal of Elementology,* **28**(1): 223-239. http://dx.doi.org/10.5601/jelem.2022.27.4.3005.