

INTRODUCTION

Several congenital abnormalities are reported in Belgian blue calves. With 5 % of consultations in the Clinic for Ruminants, the Congenital Articular Rigidity (CAR) is the most frequent [2] (Figures 1 & 2).

The clinical examination is fundamental to classify calves into four severity degrees from the less to the most severe (Table 1). This classification allows us to precise the diagnosis, to improve the prognosis and to apply the adequate treatment.



Figure 1: Congenital articular rigidity at carpal and fetlock joints in a Belgian blue calf.



Figure 2: Incomplete manual reduction of a congenital articular rigidity in a Belgian blue calf.

The objective of this study is to estimate the risk factors and to evaluate the result of the treatment for the CAR in the Belgian blue cattle breed (BBCB) applying the four grades classification (Table 1) developed in the Clinic for Ruminants of the University of Liège [3].

MATERIALS & METHODS

Our study is based on 74 calves affected by CAR referred throughout 3 years (2009 to 2011) to the Clinic for Ruminants. Sex, weight, parity of the dam and general and special examinations were recorded. The grade and the prognosis of the CAR were determined according the classification and the corresponding treatment was performed. The calves were discharged directly after the surgery and a telephone follow up was performed at least six weeks later.

Grade	Localisation	Clinical signs	Treatment	Prognosis
I	2 limbs 1 joint	General condition: good Able to stand and walk Toe-touching in standing Manual reduction : possible	Confinement for 10 days If no improvement: splint for 15 days	Good
II	2 limbs 1 joint	General condition: good Able to stand and walk Bearing on dorsal fetlock Manual reduction : possible	Splint for 15 days If no improvement: tenotomy SDFT + DDFT splint for 2 or 3 weeks	Good
III	2 limbs 2 joints	General condition: altered Unable to stand without help Bearing on dorsal fetlock Manual reduction: incomplete	Tenotomy SDFT+DDFT Partial desmotomy SL Tenotomy ULT + FCUT Splint for 3 weeks	Poor
IV	4 limbs 1 or 2 joints	General condition: bad Can not stand up alone Manual reduction: impossible	Tenotomy SDFT + DDFT Partial desmotomy SL Splint for 3 weeks or Euthanasia	Questionable

Table 1: Four grade classification of CAR according to the clinical examination and the associated treatment and prognosis [3]: SDFT: superficial digital flexor tendon, DDFT: deep digital flexor tendon, SL: suspensory ligament, ULT: ulnaris lateralis tendon, FCUT: flexor carpi ulnaris tendon.



GRADE I



GRADE II



GRADE III



GRADE IV

RESULTS & DISCUSSION

A. Clinical epidemiology

In this study, 84 % were males and the weight and age on average were respectively 55 ± 2 kg and 10 ± 1 days (Table 2). The weight of affected calves, on average, was 9 % higher than healthy calves of the same age. Grade III is the most frequent in the case load of the Clinic.

	I	II	III	IV	p
n (%)	5 (7)	27 (37)	34 (46)	8 (11)	***
Average weight (kg)	46 ± 5^a	54 ± 2	57 ± 2	57 ± 4	NS
Average age (days)	18 ± 3	11 ± 1	8 ± 1	6 ± 3	*

Table 2: Prevalence, weight and age average for the 4 different grades of CAR in the total cohort. NS: Not significant, *: $p < 0.05$, ***: $p < 0.001$.

When the grade increases from I to IV, the number of females decreases and the weight of calves increases, but not statistically significant.

Since the application of our classification by field practitioners, CAR I/II, without complications, are directly treated in farm and CAR IV are systematically euthanized. That explains the high percentage of CAR III with a poor prognosis referred to the Clinic and the decrease of referred cases compared to Sartelet with 90 cases reported in 2 years [2].

The age of the calves at the time of the hospitalization strictly depends on the severity of the CAR. CAR I and II are usually treated by the veterinarians before referring. CAR III and IV are directly referred to avoid complications. No calf was referred before 5 days of age.

Considering the localization, forelimbs were affected in the 54 % of the cases. This result slightly differs from Van Huffel *et al.* [4] where forelimbs were affected in 73.5% of the cases. CAR severity increases when hindlimbs are involved because of the impossibility to stand up (Figure 3).

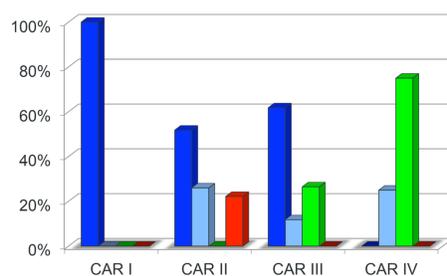


Figure 3: Rate of affected limbs in the 4 different grades of CAR. Forelimbs (dark blue), hindlimbs (clear blue), fore and hind limbs (green) and no data available (red).

The most frequent complications, due to prolonged recumbency and attempts to stand, are arthritis and omphalitis (Figure 4).

B. Treatment results

90.5 % of the cases were treated and the others were euthanized. Different treatments were performed according to the grade of CAR (Table 3).

	I	II	III	IV
ATB	n 0	1***	0	0
& VIT	% 0	3.7	0	0
SPLI	n 4	3***	0	0
	% 80	11.1	0	0
	n 1	22	31***	5
	% 20	81.5	91.2	62.5
EWT	n 0	1	3	3***
	% 0	3.7	8.8	37.5

Table 3: Treatment performed according to the grade of CAR. ATB : antibiotics, VIT: vitamines, SPLI: splint, SUR: surgery, EWT: euthanasia without treatment, *** = $p < 0.001$.

The number of surgical treatment and of euthanasia increased with the grade. The most frequent cause of euthanasia was the presence of complications associated with a high grade (Figure 4).



The overall success rate of treatment was 71.5 % (Table 4). After treatment, the number of alive calves was significantly higher than the dead calves. Different results were observed in other studies with 80 % [1] and 51.5 % [2] of success.

After conservative and surgical treatment, nursing in farm is the key of the success. The calf must be placed on a hard and atraumatic surface. The farmer have to take care daily of the milk feeding, the physiotherapy (help to stand up) and the splints.

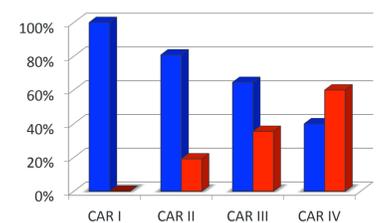


Figure 5: The success rate of treatment depending of the grade: success (blue) and failure (red).

	Dead		Alive	
	EAT	EWT	LIV	S
	6***	7***	41***	7***

Table 4: Overall success of different treatments, EAT: euthanized after treatment, EWT: euthanized without treatment, DF: dead in farm, LIV: alive, S: slaughtered, * = $p < 0.05$, *** = $p < 0.001$.

For the other grades recovery took 2 to 3 weeks after the treatment. The success rate of grade IV affected calves was very low (Figure 5). The euthanasia is the best economical issue for these cases.

In our study 10.4 % of the calves treated were slaughtered, the age and weight on average were respectively 6.8 ± 1.4 months and 125 ± 14.1 kg. 61.2 % grew normally.

CONCLUSION

We herein report different predisposing factors of this congenital defect: sex, weight at birth, parity of the dam and *in-utero* calf's position.

The four grades classification seems to be the best way to precise the diagnosis and the prognosis, and to establish the appropriate treatment.

The optimal age for the surgical treatment is 5 to 10 days to avoid stress and to improve passive immune transfer. After 10 days, complications, such as arthritis, peri-arthritis, omphalitis can occur. Bandages to protect joints, principally in calves with high grades of CAR are recommended.

Furthermore, according to the poor success rate for the grade IV, euthanasia is recommended to avoid economical losses due to the treatment and the nursing in farm.

REFERENCES

- ANDERSON D.E., DESROCHERS A., JEAN G.S. Management of tendon disorders in cattle. *Vet. Clin. North Am. Food Ani. Pract.*, 2008, **24**, 551-564.
- SARTELET A. Étude des principales maladies du système locomoteur chez les veaux de race Blanc Bleu Belge. (Mémoire, diplôme d'étude approfondie en science vétérinaire orientation médecine vétérinaire). Université de Liège: Liège, 2007, 33 p
- TOUATI K. Rigidité articulaire congénitale. Cours de chirurgie des grands animaux, 2012, 11-13.
- VAN HUFFEL X., DE MOOR A. Reflections on the role of mechanical influences on foetal movement, and the relationship to arthrogryposis multiplex congenital in calves. *Vlaam. Diergeneeskund. Tijdschrift*, 1985, **54**, 470-481.

