Congenital Articular Rigidity outbreak due to ruminal dysfunction in a Belgian blue cattle herd

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European Buiatrics Forum

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Congenital Articular Rigidity in BBCB

- Congenital arthrogryposis
- Limitation of the movements in utero
- Many aetiologies (virus, toxic, genetic,...)
- In BBCB: ***In utero* hypomobility theory**
  - I & Se deficiencies
  - Fetomaternal disproportion
    - 95 % = males
    - 81 % = posterior presentation
    - 15 % heavier

(Verschooten et al, 1969; Sartelet, 2007)

Treatments

- Digit flexor/carpal flexor tenotomy
- Splint or cast

(Verschooten et al, 1969; Sartelet, 2007)

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E19
E34
E40
E403
E25
E313
E42
E411
A25
A1
A2
A26
57
44

- Bunk score around 2
- 2 kg of haylage out of the 5 kg
- 3 kg of maize silage out of the 12 kg
- The rumination score is low for the farmer
- Water flow = 2l/min (No: 10)

12 cows last month of pregnancy:
- Body condition score: 4/5 BUT slimming at the end
- Rumen fill score: 5/5 with a hard content
- Faeces digestibility score: around 3 and 4 /5
- Mixed faeces (around 1 kg) analysis:
  - high content of 33 % (No < 30) of fibers & grains
  - lot of undigested maize grains (> 5 grains)
  - long fibers particles (> 1.25 cm).

DATA INSPECTION

- Aug. 2015 to Dec. 2015
- 120 calves born
  - 17 CAR (10 surgically treated)
  - 1 sudden death
  - around 30 % weak calves
  - 2 generalized arthrogryposis

I & Se DEFICIENCIES?

FARM DESCRIPTION

500 BBCB with 200 calvings/year
(Aug to Dec and Feb to June)

All AI or Embryo transfert

Housing: Free stalls and pastures

Feeding: 5 kg haylage, 12 kg maize silage, 10 kg pressed pulps, 1 kg concentrates 30 %, 100 g minerals & TE, 1 xiday, NO MIX

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I & Se DEFICIENCIES?

LABORATORY INVESTIGATIONS

1) PCR BTV and SBV: NEGATIVE

2) BIOCHEMISTRY: pool of late prenancy cows

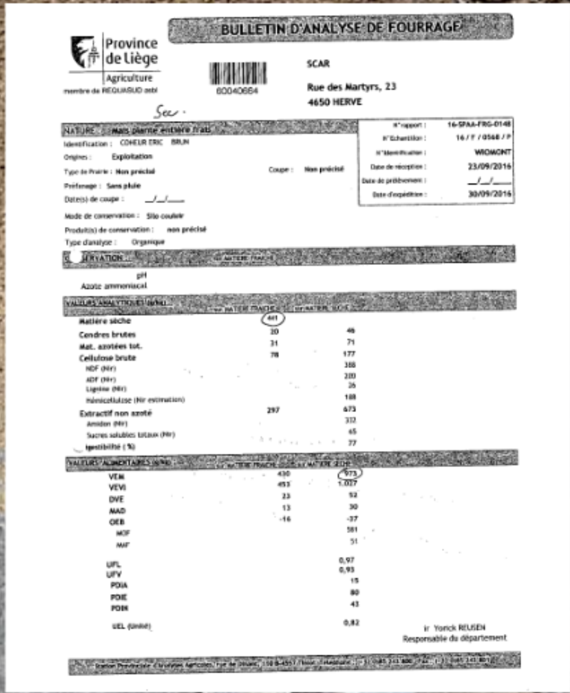
- Vit. B12 = 145 ng/l (No: 187-883) => **POOR RUMINAL FERMENTATION**
- Se = 75 µg/l (No: 80-110) => **TRACE ELEMENTS DEFICIENCIES**
- Urea = 11 mg/dl (No < 15) => **DIGESTIBLE PROTEINS DEFICIENCY**
- Cu = 75 µg/dl (No: 90-114)
- NEFA = 0.54 mmol/l (No <0.30) => **FAT MOBILIZATION**
- TP = 62-78 g/l (No: 57-81)
- Glu = 42-62 mg/dl (No: 54-110) => **ENERGY DEFICIENCY**

MAIZE SILAGE

44 % of dry matter
low content of fibers = 17 % (Normal: 19-22)
26 % of starch.

Penn-State® separator

- **upper sieve 2 % (No: 5 - 15 %)**
- **middle sieve 48 % (No: 45 - 65 %)**
- **lower sieve 50 % (No< 30 – 40 %)**



BULLETIN D'ANALYSE DE FOURRAGE

Province de Liège
Agriculture
membre de REQUASUD asbl

60040664

SCAR
Rue des Martyrs, 23
4650 HERVE

Sec.

NATURE : Maïs plante entière frais

Identification : COHEUR ERIC BRUN
Origines : Exploitation
Type de Prairie : Non précisé
Coupe : Non précisé
Préfanage : Sans pluie
Date(s) de coupe : __/__/____
Mode de conservation : Silo couloir
Produit(s) de conservation : non précisé
Type d'analyse : Organique

N° rapport : 16-SPAA-FRG-0148
N° Echantillon : 16 / F / 0568 / P
N° Identification : WIOMONT
Date de réception : 23/09/2016
Date de prélèvement : __/__/____
Date d'expédition : 30/09/2016

CONSERVATION

pH
Azote ammoniacal

VALEURS ANALYTIQUES (g/kg)	sur MATIERE FRAICHE	sur MATIERE SECHE
Matière sèche	441	
Cendres brutes	20	46
Mat. azotées tot.	31	71
Cellulose brute	78	177
NDF (Nir)		388
ADF (Nir)		200
Lignine (Nir)		26
Hémicellulose (Nir estimation)		188
Extractif non azoté	297	673
Amidon (Nir)		332
Sucres solubles totaux (Nir)		65
Digestibilité (%)		77

VALEURS ALIMENTAIRES (g/kg)	sur MATIERE FRAICHE	sur MATIERE SECHE
VEM	430	973
VEVI	453	1.027
DVE	23	52
MAD	13	30
OEB	-16	-37
MOF		581
MAF		51
UFL		0,97
UFV		0,93
PDIA		15
PDIE		80
PDIN		43
UEL (Unité)		0,82

Ir Yorick REUSEN
Responsable du département

maize silage was very dry
with a low content of fibers leading to
an increase of the by-pass starch level

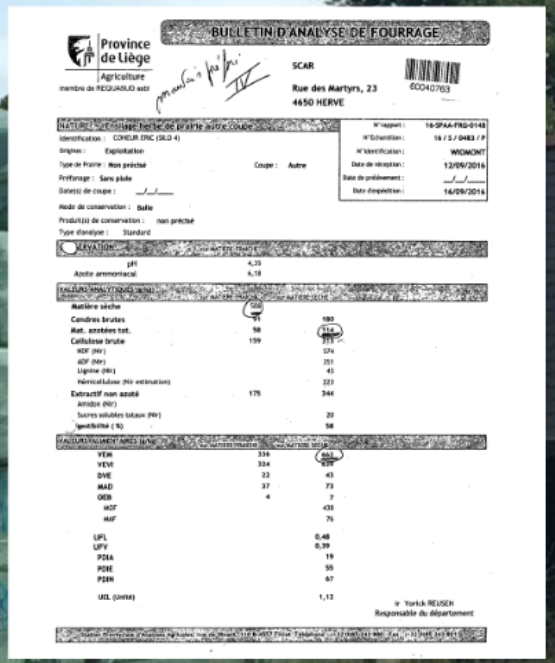
HAYLAGE

Haylage #1:

- 50 % of DM
- low levels of proteins (11 %)
- high content of cellulose (31 %) with 57 % of NDF & 5 % of lignin
- low digestible sugars (2 %)
- low rate of digestibility (58 %)

Haylage #2:

- 36 % of DM
- 18 % of proteins
- 21 % of cellulose
- Digestibility is good with a rate of 71 %



Province de Liège
Agriculture
membre de REQUASUD asbl

BULLETIN D'ANALYSE DE FOURRAGE

SCAR
Rue des Martyrs, 23
4650 HERVE

60040763

Identification : COHEUR ERIC (SILO 4)
Espèce : Exploitation
Type de Prairie : Non précisé
Préfanage : Sans pluie
Date(s) de coupe : __/__/____
Mode de conservation : Balle
Produit(s) de conservation : non précisé
Type d'analyse : Standard

Coupe : Autre

N° rapport : 16-SPAA-FRD-0148
N° Echantillon : 16 / S / 0483 / P
N° Identification : WIOMONT
Date de réception : 12/09/2016
Date de prélèvement : __/__/____
Date d'expédition : 16/09/2016

pH	4,35	
Azote ammoniacal	6,18	
Matière sèche		180
Cendres brutes		180
Mat. azotées tot.	98	554
Cellulose brute	159	313
NDF (Nh)		574
ADF (Nh)		351
Lignine (Nh)		43
Hémicellulose (NV estimation)		221
Extractif non azoté	175	344
Amidon (Nh)		
Sucres solubles totaux (Nh)		20
Digestibilité (%)		58
VEM	334	661
VEVI	334	659
DVE	22	43
MAD	37	73
OEB	4	7
MOF		430
MAF		76
UFL		0,48
UFV		0,39
PDIA		19
PDIE		55
PDIN		67
UEL (Unité)		1,12

Yorick REUSEN
Responsable du département

#1 too fibrous and
not enough digestible for the rumen

- Bunk score around 2
- 2 kg of haylage out of the 5 kg
- 3 kg of maize silage out of the 12 kg
- The rumination score is low for the farmer
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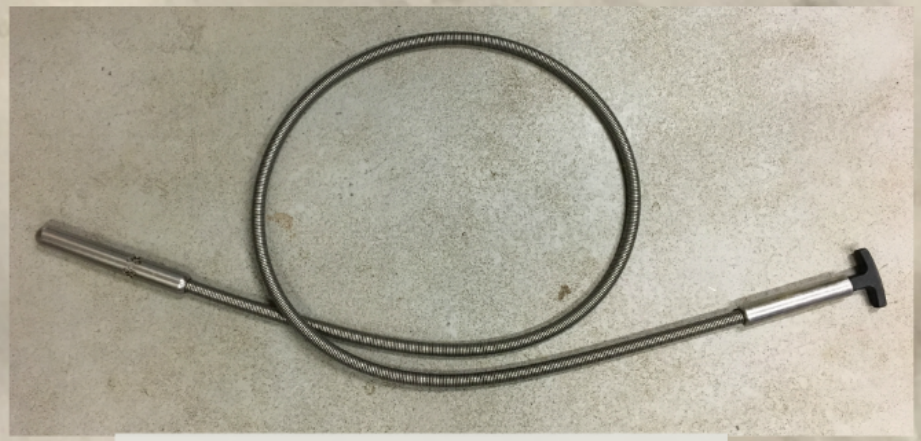
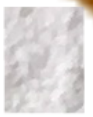
Ruminal fluid collection on 7 cows



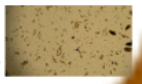
Geishauser probe "Elevator"

Ruminal pH (No: 6.5)
- 5 cows = 7.3
- 2 cows = 6.5

Methylene blue reduction test:
- 5 cows > 6 min. (higher pH)
- 2 cows around 5 min



Microscopic evaluation:
- 5 cows = low content of the different size (L, M & S) of protozoans with an absence of activity for the 5 cows with higher pH and
- 2 cows = poor protozoan activity



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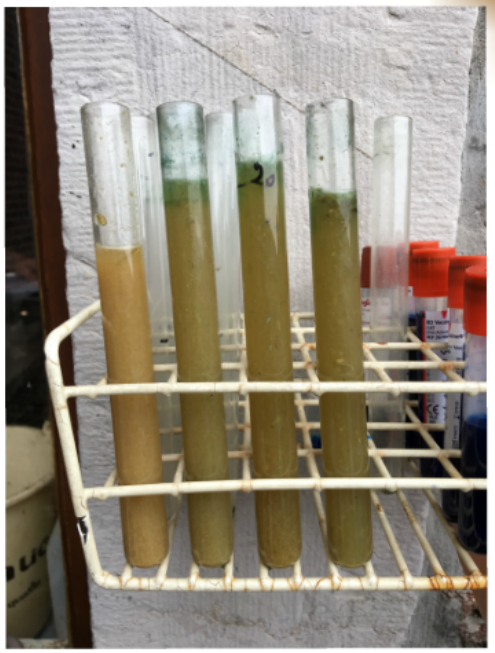

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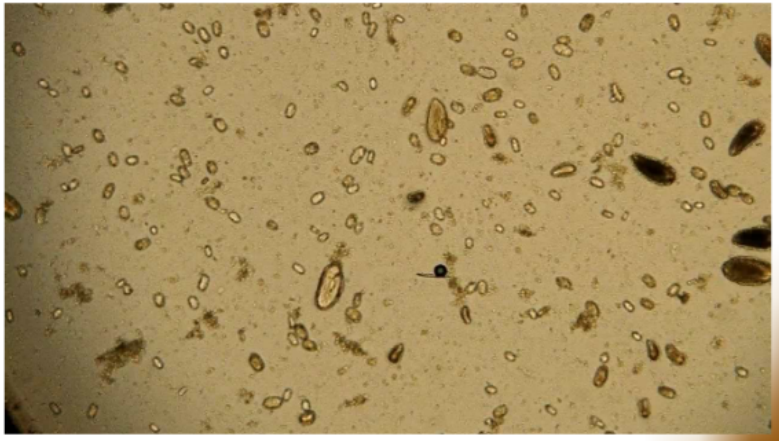

Ruminal function influenced by diet parameters in dairy herds with milk fat drop syndrome (MFDS) in Belgium

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2. Sustainable Livestock Production, FARAH & Faculty of Veterinary Medicine, ULiège, Liège, Belgium.
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INTRODUCTION

MFDS is usually attributed to herds with acidosis risks and/or maize based diet associated to shift in the rumen. It could also happen when the rumen fails to produce enough acetic acid.

In Belgium, the MFDS is also present even in grass based diets and if fibers reach largely international standards.

The objectives of this study is to compare ruminal functions with diet quality and risks of MFDS.

Fig. 1

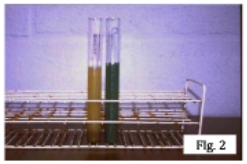

Fig. 2

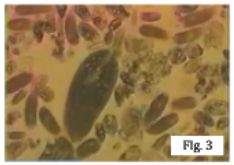

Fig. 3

MATERIELS AND METHODS

233 cows from 50-200 days in milk in 38 dairy farms with MFDS. Samples were collected on each cow and analyzed on site :

- ✓ Health scores (1 to 5 scale)
- ✓ Rumen juice with an oral probe (Flora©) (Fig.1) :
  - ➢ measurements of pH.
  - ➢ redox evaluation by methylene blue test (Fig. 2).
  - ➢ observation of protozoa (Fig. 3).
- ✓ Individual diet was evaluated and milk parameters were provided by milk control or robot.

RESULTS : 30.5 kg milk/d 188 DIM

- ✓ Average fat in milk : 3.6 ± 0,58
- ✓ Average pH : 6.5 ± 0.53
- ✓ Mean cellulose : 184.7 ± 21.9 g/kg of dry matter (DM)
- ✓ Average NDF : 394.9 ± 35.6 g/kg DM and starch was 177.7 ± 44.5 g/kg DM.

LOW RISK ON LACK OF FIBERS

NO CORRELATION BETWEEN pH and FAT (Fig. 4)

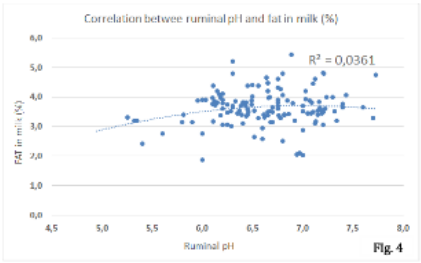

Fig. 4

Farm with MFDS:

- ➢ **only 4,7% of acidosis BUT 21% of alkalosis**
- ➢ **14.1 % of slow ruminal functions was found**

RESULTS

- ✓ Significant linear correlations between the pH in the rumen and cellulose (r=0,36, P< 0,001)
- ✓ The other significant correlations were quadratic (P<0.001).

The better model explaining (50.8%) the pH variation is:

pH = NDF, sugars, proteins and bypass starch

	OR	P< F
Alkalosis		
Slow ruminal function (redox > 4 min)	**1.8**	**0.03**
By-pass starch > 1.2 kg/d	**6.2**	**0.02**
Slow ruminal function		
Cellulose > 190 g/kg DM	**2.9**	**0.02**
Cellulose > 190 g/kg DM and sugars < 5% of DM	**3.5**	**0.02**

CONCLUSION

Links with MFDS are complex so adding bicarbonate has to be thoughtful.

Measurement of the ruminal pH only couldn't provide enough information on diagnose and treatment of ruminal problems.

To look at the management of the farm, diet, body condition score and all the ruminal activity parameters are needed to apprehended the MFDS

QUARTES

LIÈGE université 200

SYNTHESIS

- Trace elements deficiencies

- Ruminal dysfunction and impaction
  - **very poor quality of the forages**
  - the distribution of the ration **promoting sorting**
  - the **insufficient water access**

- The poor quality of the maize silage
  - lot of **indigestible fibers**
  - **by-pass starch** encourage glucose absorption in the intestine and then fattening of the cows.

RECOMMANDATIONS

- **Add 1 kg of wheat/day/cow** to add starch in the ration.
- **Injectable and oral micronutrients supplementation** was recommended for the next calvings.
- **A vertical diet feeder** to avoid sorting and was accepted by the farmers.
- For the next pasture season, a micronutrients supplementation was recommended

CONCLUSION

IN UTERO HYPOMOBILITY THEORY

- 1st descrided evidence
- Lack of abdominal space = impaction + fat
- Ruminal dysfunction
  - decreases micronutrients absorption despite the sufficient intake
  - protein-energy malnutrition

MONITORING OF INGESTED AND METABOLIZED FOOD

TOOLS FOR MONITORING TRACE ELEMENTS DEFICIENCIES

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