ESTIMATING PASTORAL GRASS INTAKE BY USE OF ACCELEROMETERS

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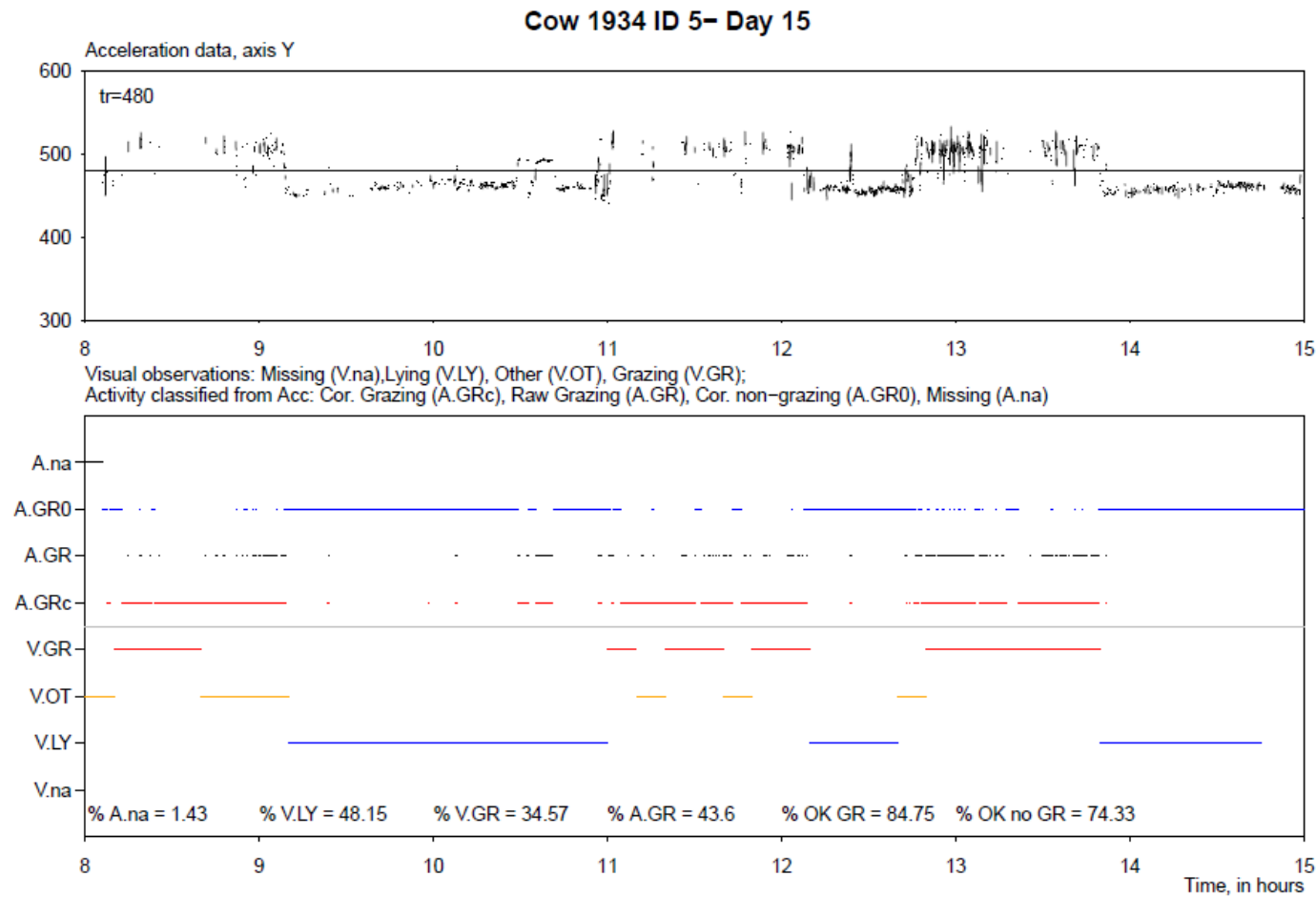AARHUS UNIVERSITY

1. My background

2. Why do we need more detailed knowledge of grass intake on pasture

3. What methods have been used to calibrate ?

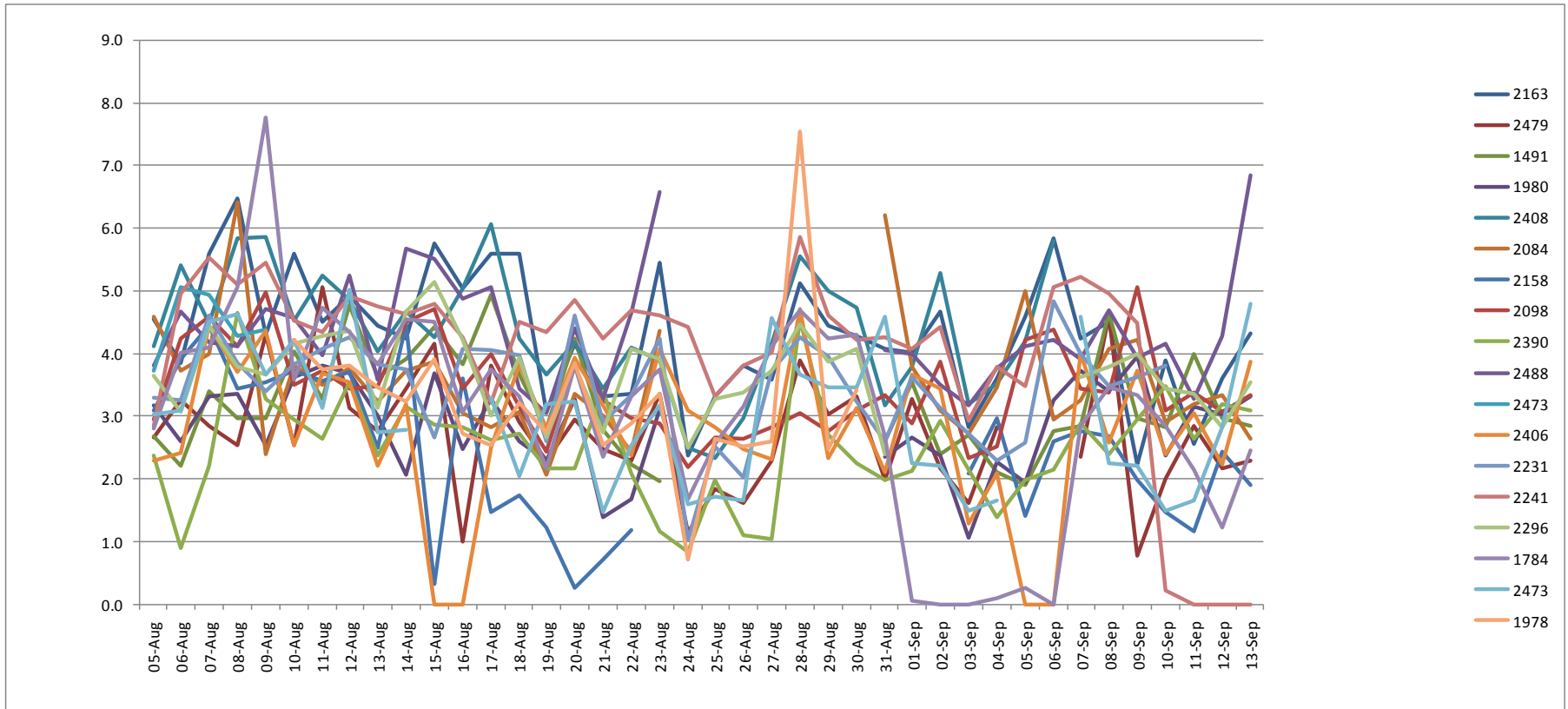4. What sensors are on the marked that could be used ?

ATTACHMENT OF THE SENSORS

Cow 1934 ID 5– Day 15

FARM DATA 2011

IS GRAZING TIME ENOUGH
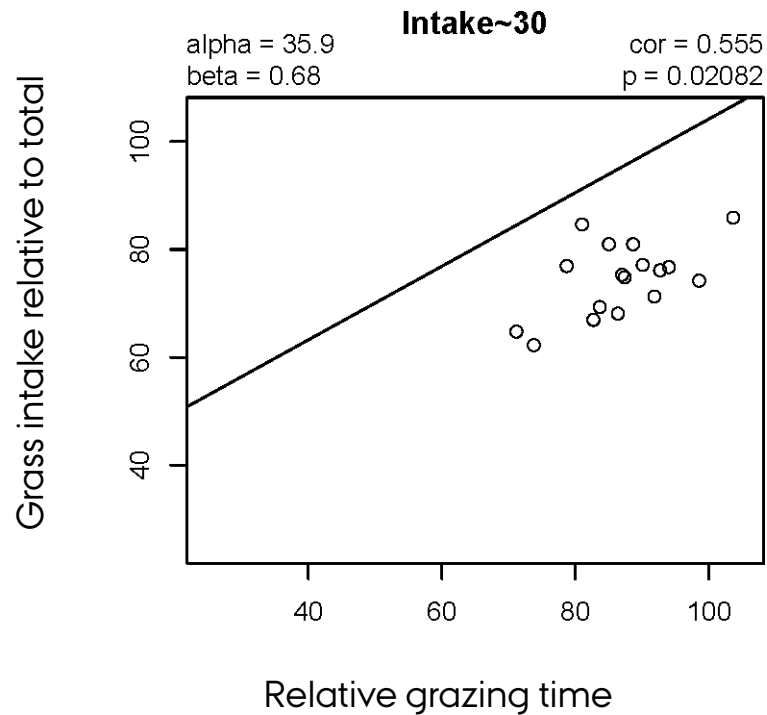
› We can say something about their eating behaviour
› We can identify individual cow specificity and possible abnormalty
› We can identify if the pasture is offering too little

However,

CORRELATION WITH GRASS INTAKE IS NOT VERY GOOD

MANUALLY COUNTED BITES

| Season	Nb of periods (Nb of cows)		Period length, sec		Fz bites/min		Cow effect [a]	Trial effect [a]
	Trial 1	Trial 2	Trial 1	Trial 2	Trial 1	Trial 2		
spr09	142 (10)	147 (10)	145 ± 26	143 ± 25	52 ± 10	55 ± 10	*	*
aut09	27 (10)	48 (10)	95 ± 11	98 ± 12	60 ± 9	48 ± 9	**	***
aut10	66 (5)	21 (2)	139 ± 9	141 ± 12	58 ± 10	47 ± 12	***	**

In order to try and supply extra information

INCLUDING BITES WE ARE FINDING GOOD CORRELATIONS

D1 min graz 30

R² = 0.8645

D1 bites 30

R² = 0.9642
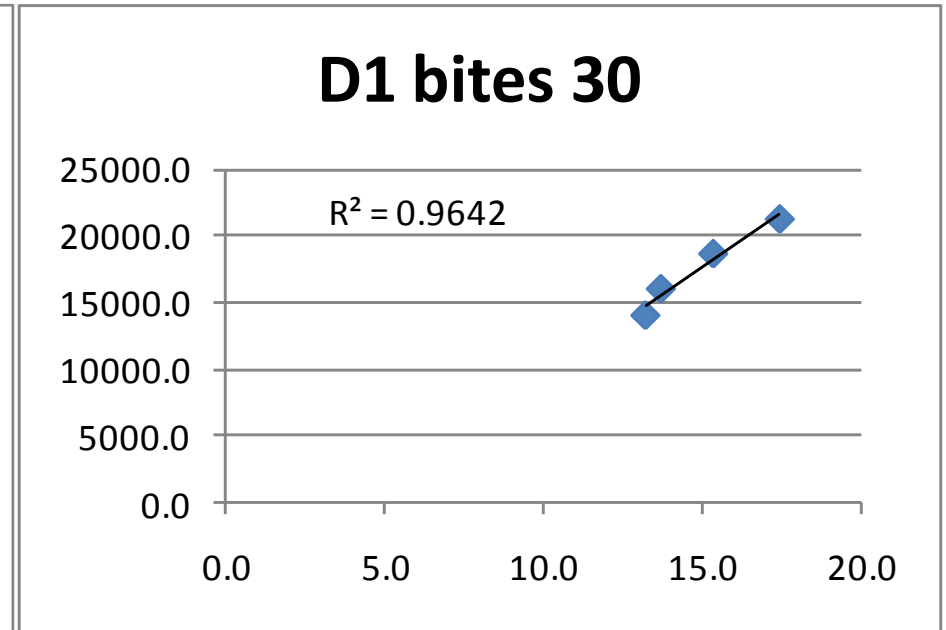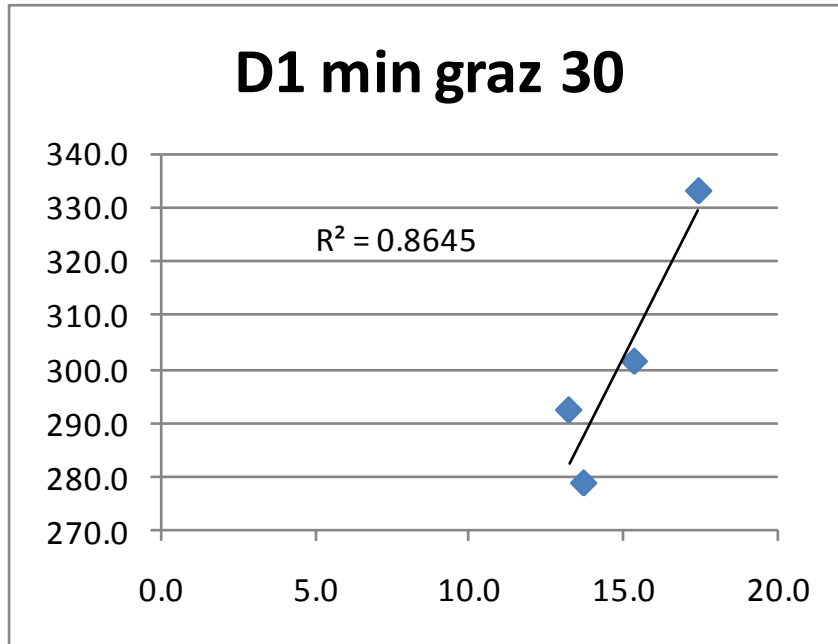
MODELLING TO FIND ACCURACY
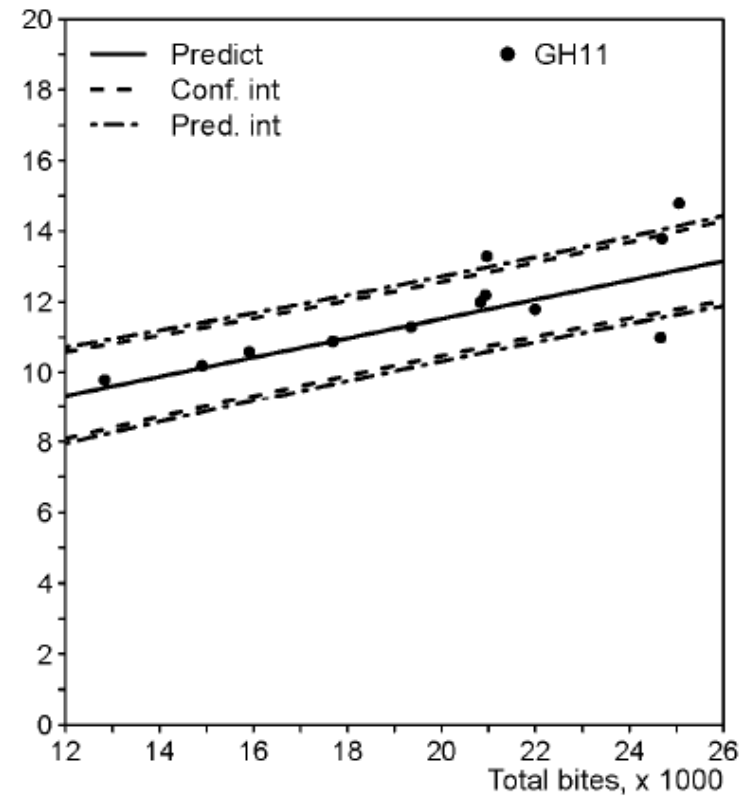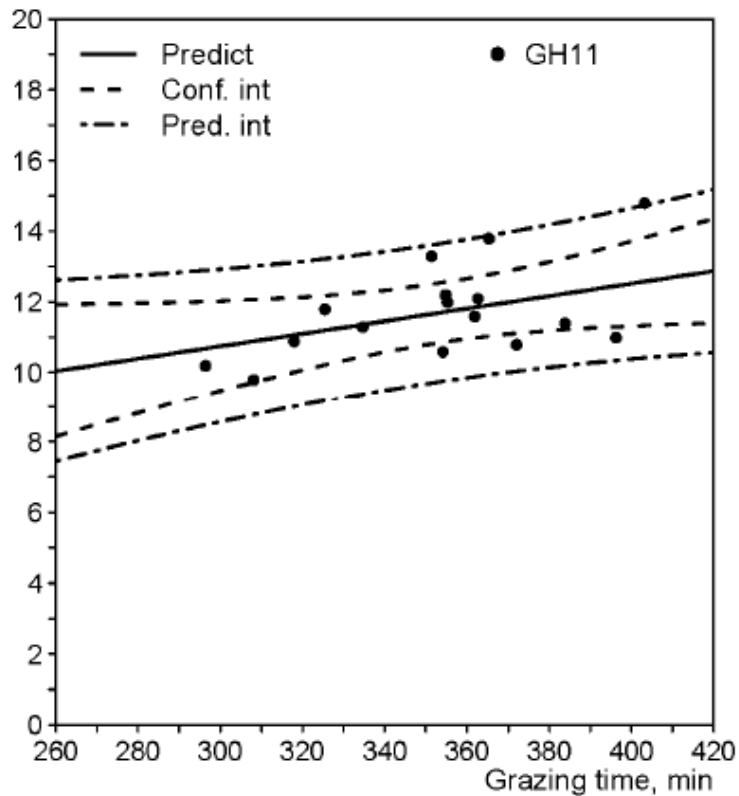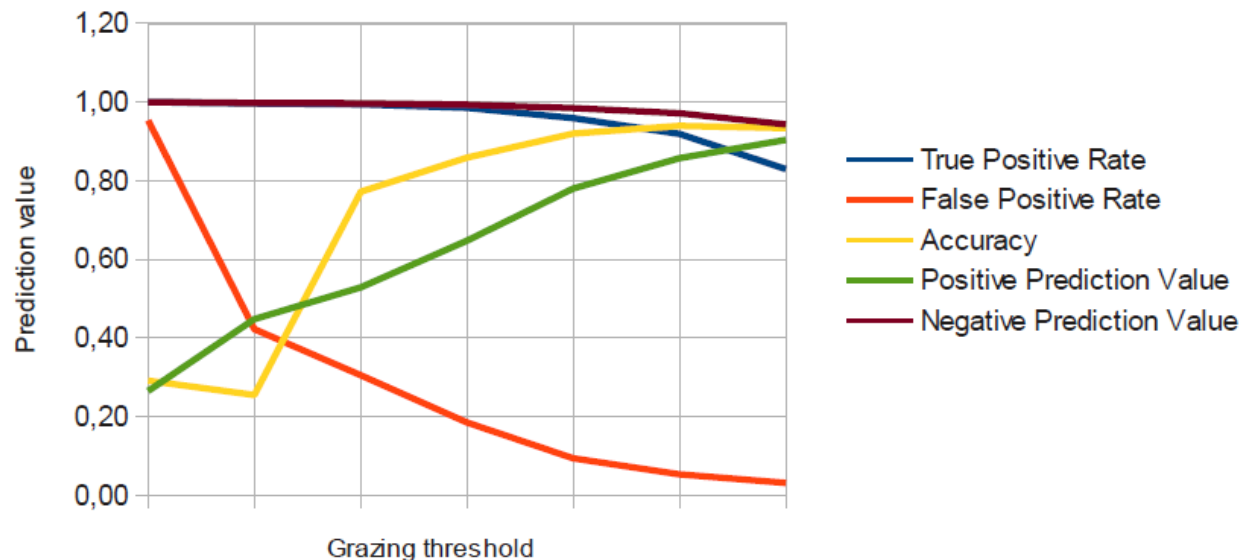
ACCELEROMETER DATA 16 HZ. SHAPE MATCHING
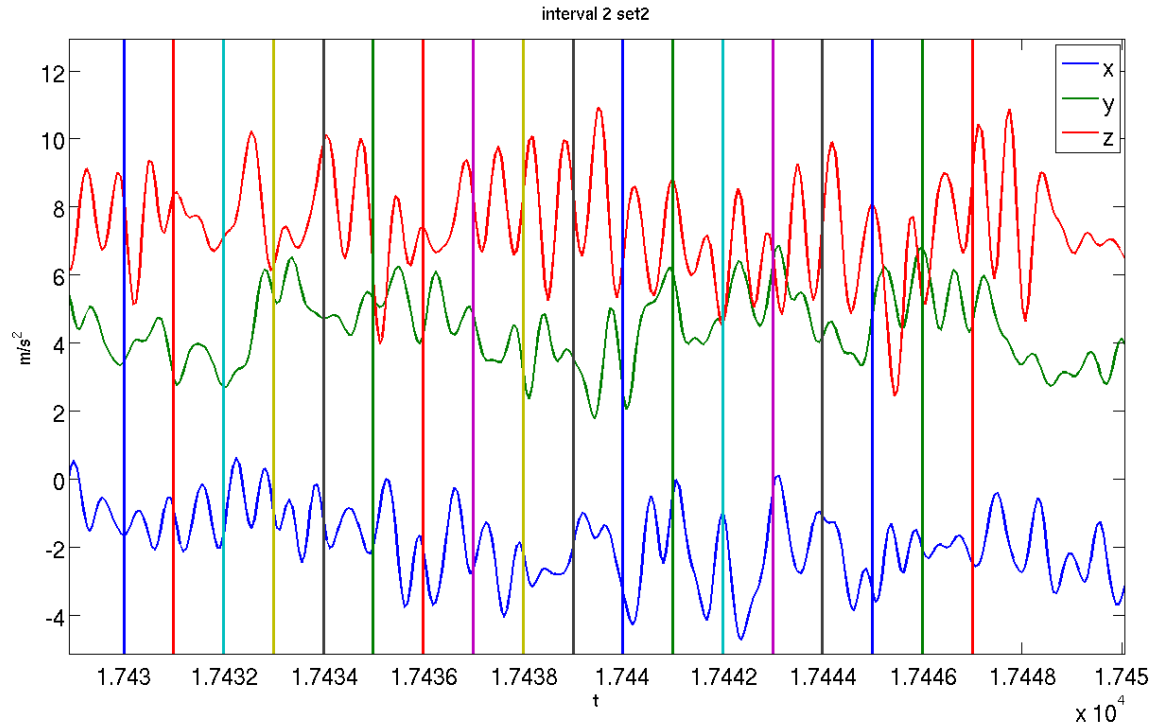
Section of sensor data for dataset # 2, manual bite markings as vertical lines

DOES BF ESTIMATE GRAZING

Grazing correspondance with increased threshold for bites per second

Figure 7 Evaluation of measured bite frequency correspondence with IceTag grazing annotations, based on dataset number 2 with correlation threshold at 0.65

THRESHOLD VALUE FOR BITE MOVEMENTS

› when we measure more than 25 bites per minute we can be sure that 95% of the cows are grazing according to the IceTag annotations.

We tried to make a control with IGER jaw movement sensors. Program GRAZE gives annotations for Bite, chew and unknown.

Automatic = accelerometer modelling

cow#	date	starttime	Manual count	Automatic count	IGER count	time [s]	BPMm	BPMa	BPMi	abs aError^2	iError^2	error/minute aError^2	iError^2
5157	05-09-12	10:17:05	84	94	102	143,00	35,24	39,44	42,80	100	324	17,60	57,04
5157	05-09-12	10:19:43	81	117	92	139,94	34,73	50,17	39,45	1296	121	238,25	22,24
5520	05-09-12	10:01:59	44	49	94	77,81	33,93	37,78	72,48	25	2500	14,86	1486,43
5520	05-09-12	10:04:28	62	43	115	120,00	31,00	21,50	57,50	361	2809	90,25	702,25
5520	05-09-12	10:07:12	45	45	128	135,06	19,99	19,99	56,86	0	6889	0,00	1359,53
6331	05-09-12	09:56:56	125	103	N/A	124,81	60,09	49,51	N/A	484		111,85	N/A
6331	05-09-12	09:59:21	130	104	N/A	134,31	58,07	46,46	N/A	676		134,90	N/A
6518	05-09-12	10:10:38	72	71	N/A	137,31	31,46	31,02	N/A	1		0,19	N/A
6518	05-09-12	10:13:22	77	77	N/A	147,44	31,34	31,34	N/A	0		0,00	N/A

		MSE		MSE per 60sec	
var		459	3559	109	900
std		21	60	10	30
var		501		120	
std		22		11	

THRESSHOLD BITE FREQUENCY TO DETERMINE GRAZING
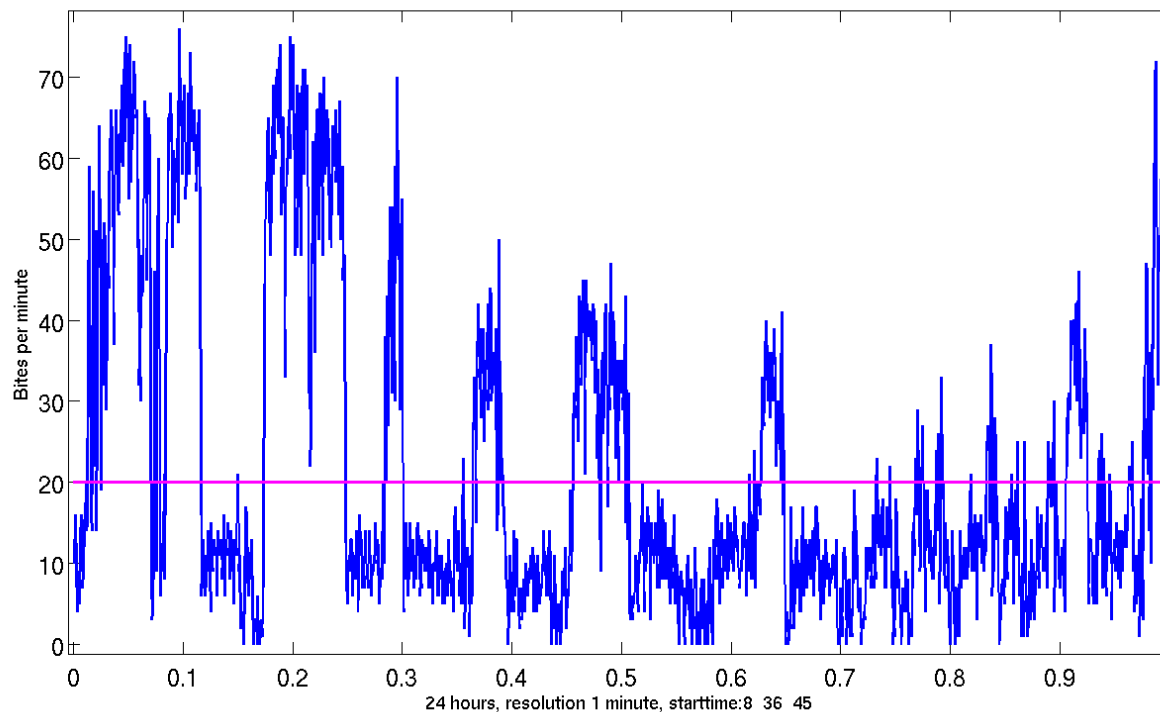
Bite frequency,first 24 hours . Horizontal line indicates a reasonable bite frequency vs grazing threshold.

Graz2Milk