VALIDATION OF A DEVICE FOR AUTOMATICALLY MEASURING OF LYING BEHAVIOUR IN DAIRY COWS
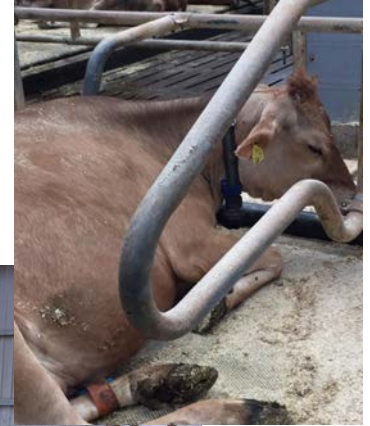

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OBJECTIVES FOR THE VALIDATION

➢ Using the device in my experiments

➢ Cheaper than other devices

➢ The Device has not been validated before

➢ Can it be used for research

➢ Focus on slatted floors vs deep bedding

WHY IS LYING BEHAVIOUR IMPORTANT

➢ Lying down is a behavioural need

➢ Limited time for lying down

➢ If lowered for longer time it can reduce the welfare of the cow
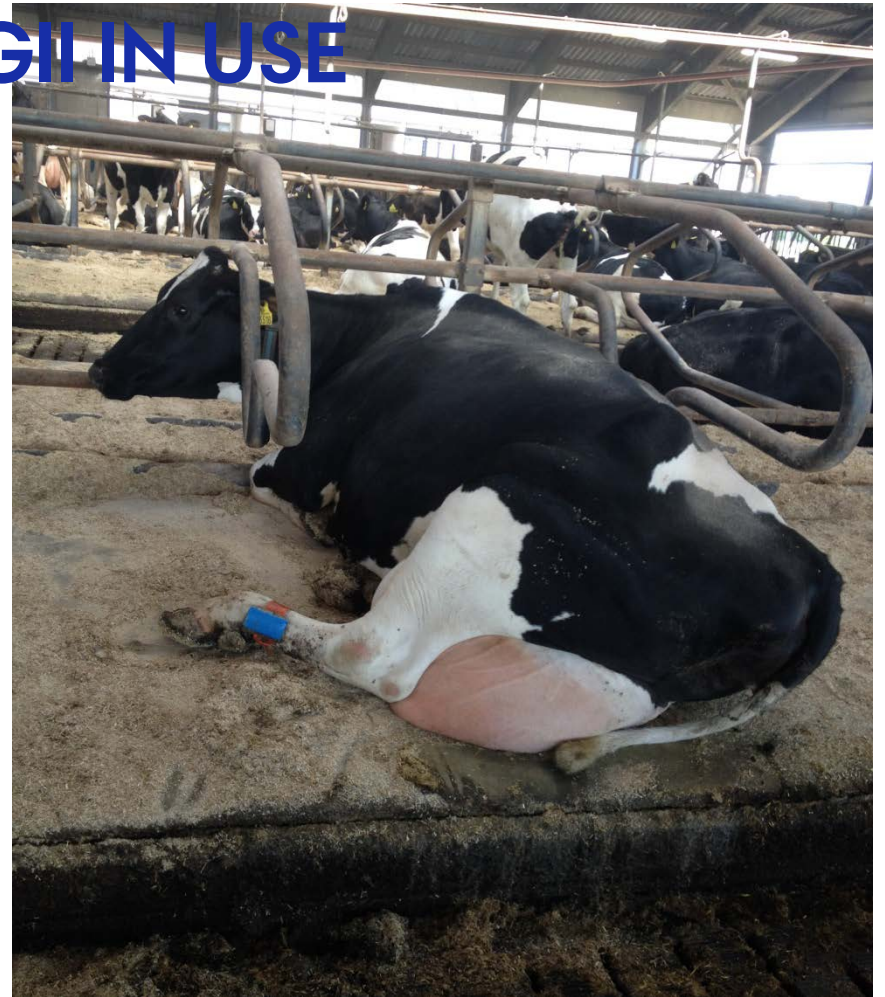
➢ Welfare indicator

THE VALIDATED DEVICE

➢ AfiTagII, Afimilk, Israel

➢ Steps, lying time, standing time, lying bouts

➢ In praxis used for heat detection

➢ Attached to hind leg

➢ 3D accelerometer

➢ Long distance transmission

➢ Data in intervals of 15 min send hourly

➢ Daily lying calculated from algorithm

AFITAGII - OUTPUT OF RAW DATA

AnimalIdA	TagID	GroupNum	EndTime	Starttime	Steps	LyingBout	LyingTime	StandingTi	Dato
6530	60	1	20-05-16 00:06:50	20-05-16 00:06:50	25559	37	471	38847	20-05-2016
6530	60	1	20-05-16 00:21:50	20-05-16 00:21:50	25559	37	486	38847	20-05-2016
6530	60	1	20-05-16 00:36:50	20-05-16 00:36:50	25559	37	501	38847	20-05-2016
6530	60	1	20-05-16 00:51:50	20-05-16 00:51:50	25559	37	516	38847	20-05-2016
6530	60	1	20-05-16 01:06:50	20-05-16 01:06:50	25559	37	531	38847	20-05-2016
6530	60	1	20-05-16 01:21:50	20-05-16 01:21:50	25559	37	546	38847	20-05-2016
6530	60	1	20-05-16 01:36:50	20-05-16 01:36:50	25559	37	561	38847	20-05-2016
6530	60	1	20-05-16 01:51:50	20-05-16 01:51:50	25559	37	576	38847	20-05-2016
6530	60	1	20-05-16 02:06:50	20-05-16 02:06:50	25559	37	591	38847	20-05-2016
6530	60	1	20-05-16 02:21:50	20-05-16 02:21:50	25559	37	606	38847	20-05-2016
6530	60	1	20-05-16 02:36:50	20-05-16 02:36:50	25577	37	618	38848	20-05-2016
6530	60	1	20-05-16 02:51:49	20-05-16 02:51:50	25683	37	618	38862	20-05-2016
6530	60	1	20-05-16 03:06:49	20-05-16 03:06:50	25765	37	618	38875	20-05-2016
6530	60	1	20-05-16 03:21:49	20-05-16 03:21:49	25823	37	618	38889	20-05-2016
6530	60	1	20-05-16 03:41:56	20-05-16 03:41:56	25856	38	624	38897	20-05-2016
6530	60	1	20-05-16 04:41:56	20-05-16 04:41:56	25856	38	684	38897	20-05-2016

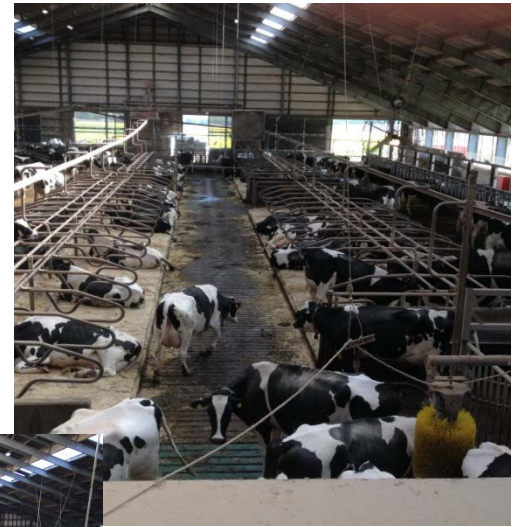# THE AFITAGII IN USE

VALIDATION IN 2 STEPS

1. Comparison with direct observations

2. Comparison with Icequbes (IceRobots, UK)

Performed at Danish Cattle Research Centre, Aarhus University
➢ Automatic milking system
➢ Free cow traffic

DIRECT OBSERVATIONS

➢ 20 lactating cows on slatted floor

➢ 20 dry cows on deep bedding

➢ 10 Jersey from 1 section

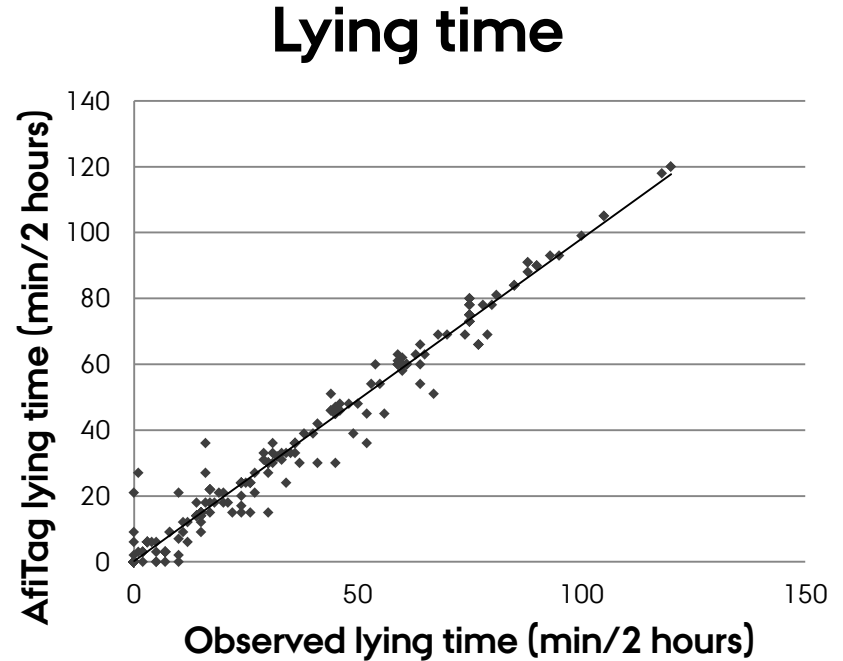➢ 10 Holstein from 1 section

➢ Both primi- and multiparous

DIRECT OBSERVATIONS - METHOD

➤ Scan sampling every minute

➤ Total of 2 hours/cow

➤ Lying/not lying

➤ 2 observers

➤ Differed in time of day

➤ Differed in stage of lactation

Direct observations - Lying time

- Lying time in min/2 hours
- Strong positive correlation
- $r = 0.98$

Lying time

DIRECT OBSERVATIONS - LYING BOUTS

Slatted floors	Mean	Min	Max	Deep bedding	Mean	Min	Max
Observed	1.01	0	3	Observed	0.85	0	3
AfiTagII	0.97	0	3	AfiTagII	0.93	0	5

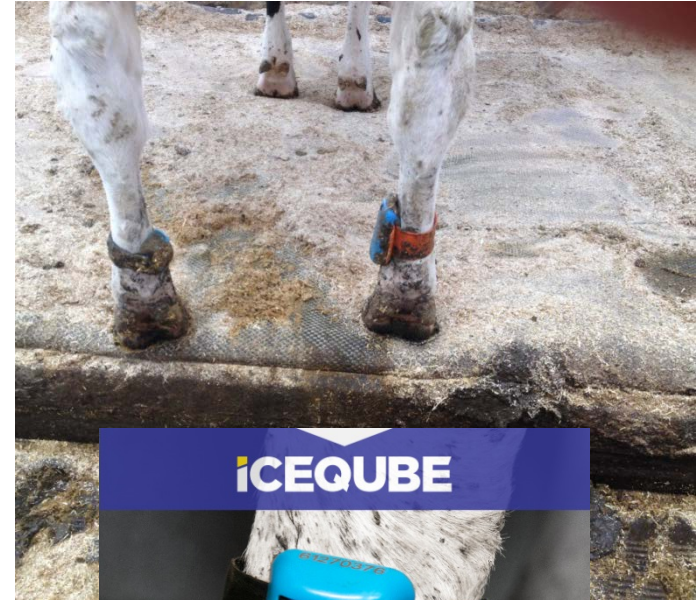| Positive predictive value = **0.96**	Positive predictive value = **0.85**

COMPARISON WITH OTHER DEVICE

➢ Icequbes (IceRobots, UK)

➢ 21 lactating cows

➢ Both Jersey and Holstein

➢ Both primi- and multiparous

➢ Total of 698 days (6 - 43 days)
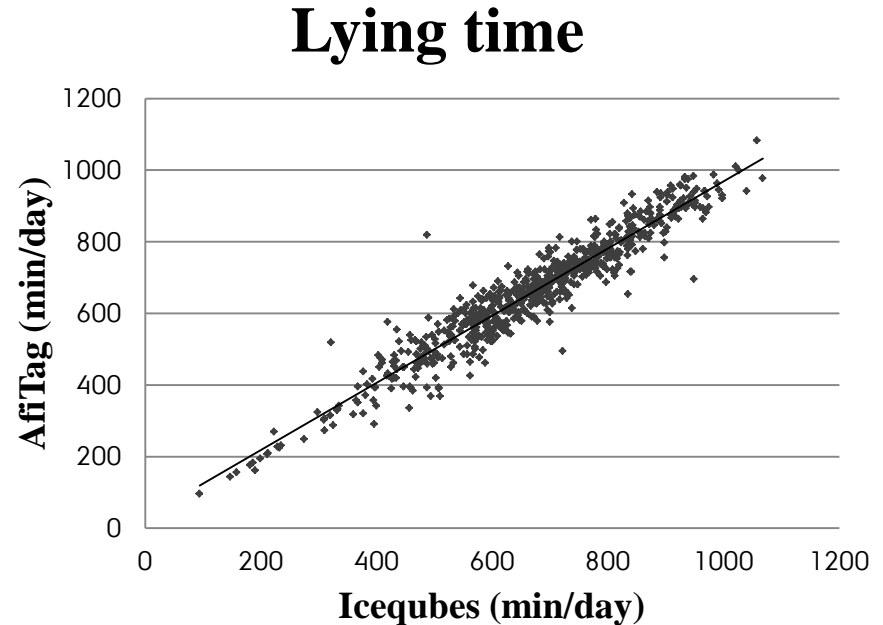
➢ Exclusion of 14 % of data in total
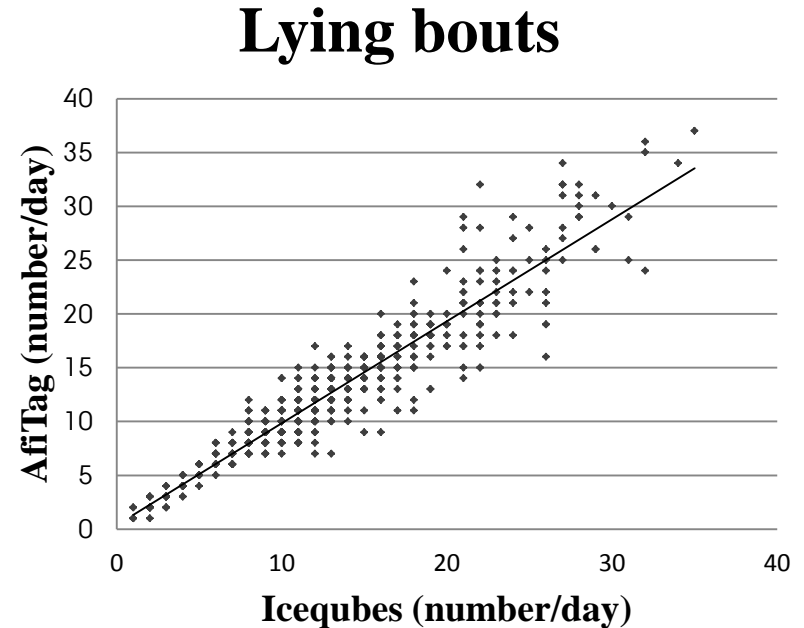
      Icequbes = 5 %

      AfiTag   = 9 %

ICEQUBE

COMPARISON WITH OTHER DEVICE – LYING TIME

➤ Daily lying time in minutes

➤ Strong positive correlation

➤ *r* = 0.95

➤ Mean lying time

AfiTag = 11.0 hours/day

Icequbes = 11.2 hours/day

Lying time

COMPARISON WITH OTHER DEVICE – LYING BOUTS

- Daily frequency of lying bouts
- Strong positive correlation
- r = 0.94
- Mean lying bouts
  AfiTag = 12.4 number/day
  Icequbes = 12.7 number/day

Lying bouts

PRACTICAL IMPLICATIONS

- ➤ Skin lesions - Hair loss to wounds
- ➤ January 2015 – January 2016
- ➤ Total of 155 cows
- ➤ Device moved 60 times
- ➤ More incidents with Holstein than Jersey
- ➤ Preventive actions

TO SUM UP

✓ High correlation for lying time and lying bouts with direct observations

✓ High correlation between AfiTagII and Icequbes

▪ Problems with skin lesions

Need for further development of the design

QUESTIONS