

Effect of concentrate allowance in an automatic milking system

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Background



- **Automatic milking (robot) has increased heavily in Denmark in recent years. Today ~20% of Danish dairy cows are automatically milked**
- **Automatic milking is based on cows' voluntary visits to the robots**
- **The milking robot should attract the cow**
- **The cows motivation to be milked is not strong enough to obtain optimal milking frequency**
- **Concentrate is used as reward in the robot**

Aim



Examine the effect of:

- **Amount of concentrate offered in the robot**
- **Energy concentration in *ad libitum* feed**

On:

- **Frequency of visits in the robot**
- **Feed intake and production**

Research unit



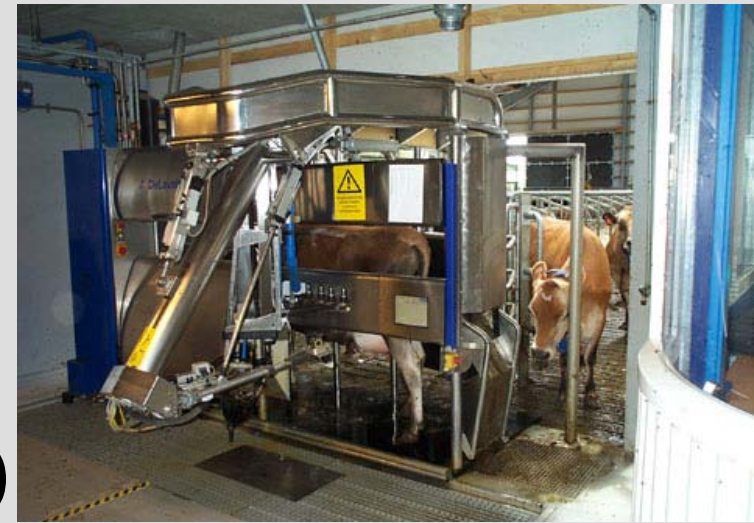
Research unit with 150 cows (Danish Cattle Research Centre)

55 Danish Holstein (DH)

55 Danish Red (DR)

40 Danish Jersey (DJ)

Automatic milking system (de Laval)

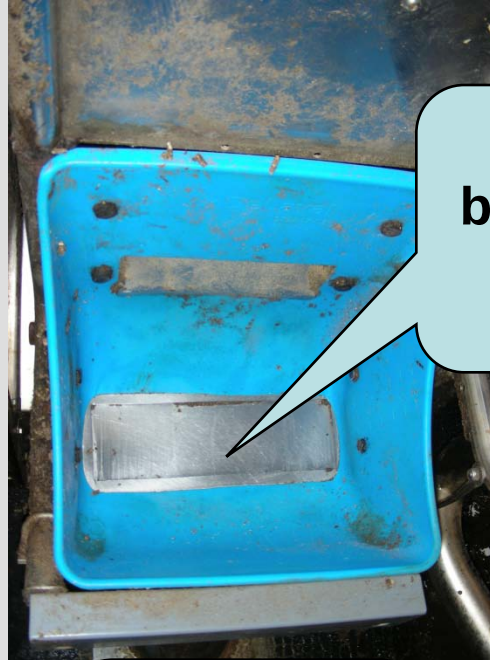


Automatic forage intake measurement (Insentic)



**Concentrate
manger in the
robot.**

**Automatic
emptying and
registration of
weight of
residues**

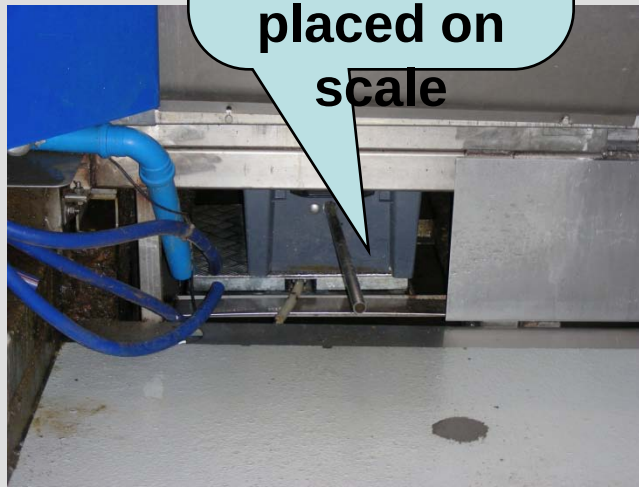


**Manger
bottom opens
when cows
leave robot**



**Residues
lead
below
robot**

**Residues
sampled
below
robot, box
placed on
scale**



**Weight
changes
merged
with cow**



Experiment



87 cows (34 Holstein, 35 Red og 18 Jersey)

Divided on 4 treatments at calving

Period 20-70 DIM used for data analysis

Treatments



Treatment	H3	M3	M6	L6
Energy concentration in MR	High	Medium	Medium	Low
Concentrate offer in robot (kg / d)	3	3	6	6
Concentrate feeding rate (g / min)	300	300	600	600

Treatments – Mixed ratios



Composition of mixed rations (% DM) and energy concentration (forage was 2/3 maize silage and 1/3 grass/clover silage)

	High	Medium	Low
Concentrate	55	26	12
Forage	45	74	88
NEL MJ/kg DM	7.42	6.94	6.63

Results - Per cow per day



Treatment	H3	M3	M6	L6	
Mixed ration	High	Medium	Medium	Low	P Treatment
Concentrate	3	3	6	6	
<i>Concentrate (kg)</i>					
Intake	2.3	2.3	3.4	4.4	<0.0001
Residual	0.2	0.2	0.5	0.3	0.06
<i>Mixed ration</i>					
Kg DM	18.1	15.4	15.3	13.0	<0.0001
<i>Milk yield</i>					
Kg ECM	34.9	30.2	31.8	31.4	0.01
<i>Visits robot</i>					
Milkings	2.66	2.52	2.64	3.13	0.004
Rejections	0.91	0.57	1.30	2.44	<0.0001

Results



Treatment	H3	M3	M6	L6	
Mixed ration	High	Medium	Medium	Low	P Treatment
Concentrate	3	3	6	6	
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	Visits	Concentrate left over	ECM yield	MR intake
High energy concentration in MR	~	~	↑	↑

Results



Treatment	H3	M3	M6	L6	
Mixed ration	High	Medium	Medium	Low	P
Concentrate	3	3	6	6	Treatment
<i>Concentrate (kg)</i>					
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	Visits	Concentrate left over	ECM yield	MR intake
Low energy concentration in MR	↑	(↓)	~	↓

Results



Treatment	H3	M3	M6	L6	
Mixed ration	High	Medium	Medium	Low	P Treatment
Concentrate	3	3	6	6	
<i>Concentrate (kg)</i>					
Intake	2.3	2.3	3.4	4.4	<0.0001
Residual	0.2	0.2	0.5	0.3	0.06
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	Visits	Concentrate left over	ECM yield	MR intake
Increased concentrate offer	~	↑	~	~

Conclusion



- Frequency of voluntary visits to the robot can be affected by changing amount of concentrate offered and energy concentration in ad libitum feed

Further:

- Fed concentrate as proportion of offer -
- Concentrate intake as proportion of fed -

were both considerable below 100%

→ Offer is not the same as fed out

→ Fed out does not mean that it is eaten

→ Left over will be eaten by other cows than intended

(especially for automatic concentrate feeders in robots)

**Thank you
for your
attention**

