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INNOVATION IN LIVESTOCK PRODUCTION: FROM IDEAS TO PRACTICE

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Milking production, milking frequency and rumination time of grazing dairy cows milked by a mobile AMS

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Introduction

- AMS spread worldwide

=> new challenges to improve their profitability

- Combining AMS and grazing : possible?

Yes

- but needs to warrant good traffic of cows to the robot

Parameters influencing the traffic of grazing cows to the robot?

A) Parameters linked to the cows:

- Hierarchy
- Gregarious behaviour
- « Personnality »

Parameters influencing the traffic of grazing cows to the robot?

B) Parameters controlable by the farmer

- General herd management (calving, number of cows, etc)
- Grazing management
- Concentrate allocation
- Water allocation
- Quality of paths (smooth, mud,…)
- Herd's health (mammitis, lameness)

Parameters influencing the traffic of grazing cows to the robot?

C) Uncontrolable parameters

- Weather conditions
- Soil conditions
- Day/night rythm
- Distance to the robot

Weather conditions

- The average temperature has increased by ~1°C over the past hundred years (IPPC, 2013)
- Heat stress periods are likely to be more numerous in temperate areas
- How will heat stress influence cows’ traffic to the robot? => Aim of this study

Material and Methods

- Experimental farm of Sart Timan (Liège – Belgium)
- Herd: 45 Prim'Holstein dairy cows
- Milked on pasture by a mobile AMS (Lely A3®)

Description of the grazing system

Description of the grazing system

Grazing management

- Grass height and cover evaluation
- Day and night allocation
- Strip-grazing
- Grass sampling => nutritional value

Water availability:

- in pastures: depending on pastures
- Big pond near the robot (700 L)

Determination of Heat stress periods

- Temperature humidity indexes (THI) were calculated according to Ingraham et al (1979)
- $THI = (1.8 \times AT + 32) - (0.55 - 0.55 \times RH) \times [(1.8 \times AT + 32) - 58]$

AT: ambiant T°C- RH: relative humidity (%)

- Heat stress periods were defined by THI >72
- 2 periods of heat stress were identified in July (J) and in August (A)
- Each heat stress period compared with a “normal period”(N).

Results

Experimental design

		Nb cows	DIM	LN	distance	THI
July	HS	33 ± 0	183 ± 85	2.46 ± 1.68	700 ± 0	78.4 ± 4.0
	N	33 ± 0	182 ± 85	2.39 ± 1.64	635 ± 150	69.8 ± 2.0
August	HS	33 ± 0	186 ± 92	2.58 ± 1.85	250 ± 34	77.3 ± 4.2
	N	33 ± 0	191 ± 75	2.30 ± 1.60	304 ± 0	67.9 ± 1.6

DIM: days in milk; LN: lactation number;
Distance: distance from the paddock to the robot.

Results

Grass supply

Month	Grass height (cm)		Grass yield (kg DM/ha)	Grass available (kg DM/cow/d)
	Entry	**Exit**		
July	12.0	6.6	1587	15
August	11.4	6	1734	17

Results

	July		August	
	N	HS	N	HS
Milk yield (kg/cow/d)	21.8 ± 0.6***	18.9 ± 0.6	17.8 ± 0.9 ***	19.4 ± 0.9
Milkings (/cow/d)	2.19 ± 0.08***	2.54 ± 0.11	2.32 ± 0.10NS	2.34 ± 0.11
Refusals (/cow/d)	0.72 ± 0.15 ***	1.82 ± 0.21	0.90 ± 0.17NS	0.98 ± 0.19

Values are least square means ± SE
***: p< 0.001 – NS: p>0.05
Stat: SAS 9.3 proc mixed repeated day random animal – AR(1)

Results

	July		August	
	N	HS	N	HS
Rumination (min/cow/d)	440 ± 14***	365 ± 15	410 ± 14 ***	306 ± 17

Values are least square means ± SE
***: p< 0.001 – NS: p>0.05
Stat: SAS 9.3 proc mixed repeated day – AR(1)

Conclusion

HS	July	August
Milk Yield	↘	↗
Milkings	↗	=
Refusals	↗	=
Rumination	↘	↘

Conclusion

Difference between July – August:

- Waste of energy linked to increase in milkings and refusals
- Increase of distance to the robot: 700 m in July – 270 m in August
- Grass cover lower in July (15 kg vs 17 kg)
- Access due to water nearby the robot => easier in August
- THI higher in July

Conclusion

Rumination

- Decrease in rumination time during heat stress confirmed by other studies (Calamari et al., 2011)

$\Rightarrow$Heat stress has variable effects on milking parameters

AUTOGRASSMILK

Thank you for your attention

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