Can suckling increase cheese yield and welfare in the Swedish dairy goat?

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Dairy Goats in Sweden

Intensive systems
✓ Early separation of kids
✓ Milking only

Semi-intensive and extensive systems
✓ Does and kids together for longer periods....
Early separation of kids:

» How is milk offtake affected?

» How is milk composition affected?

» The workload can be reduced by 27% by keeping mother and offspring together\(^1\)

\(^1\)Marnet & Komara, 2007
Milk is stored in 2 udder compartments

**Alveolar compartment** *(alveolar lumen and small milk ducts)*

- Milk ejection is necessary to empty that milk *(oxytocin)*
- Higher fat content *(larger fat globules)*

**Cisternal compartment** *(large ducts, gland and teat cisterns)*

- No milk ejection is needed
- Lower fat content
Goats ≠ cows

Goats have big gland cisterns
Storage capacity between 40-80%

Cows have small gland cisterns
Storage capacity around 20%

Therefore, goats can be milked without milk ejection...
..but the milk contains less fat
Oxytocin concentrations increased during suckling but not during milking

The importance of milk composition

Dairy goats in the northern Europe are known to produce milk with low fat, total protein and casein content.

Lower cheese yields

This is partly genetic but could also be due to different udder morphology or different management systems (suckling or not)?

AIM:
Investigate if milk fat content and cheese yield could be improved by suckling
Milk composition and hormone levels in plasma in goats during suckling combined with milking compared to milking only

8 goats, 2 treatments, 2 days (early lactation)

**Day 1;**
Suckling combined with milking
Teat 1 = Suckling
Teat 2 = Milking

**Day 2;**
Milking only
Teat 1 = Sham suckling
Teat 2 = Milking

*Milk and blood sampling:*
before and after suckling from both teats 1 and 2;
+ continuously during suckling from the milked teat (=2) - until the kid stopped to suckle
Analyses

» Milk composition was analyzed in fresh milk (40°C) with an infra-red spectrometry method (MIRIS)

» Casein content was analyzed by a rennet coagulation method

» Oxytocin was analyzed by ELISA
Oxytocin in plasma during suckling/milking

Blood samples during milking

Oxytocin in plasma (pmol/L)

- Suckling
- Milking

Start

Stop

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Fat concentration (%)
How is the individual cheese yield affected by different suckling /milking strategies?

12 lactating goats, 4 weeks, 4 treatments, cross-over design

- **Free suckling for 16h (2X milking)**
  - Treatm.1 = Suckling before milking (S-16)
  - Treatm.2 = Milking before suckling (M-16)

- **Free suckling for 8h (1X milking)**
  - Treatm.3 = Suckling before milking (S-8)
  - Treatm.4 = Milking before suckling (M-8)
Casein content & individual cheese yield

1. Rennet added (35 µl) to 10 ml of milk
2. Coagulation for 1h
3. The curd was vertically cut into four similar rods
4. Centrifuged at 1650 x g (20 min 28°C)
5. Whey was weighed (g)
Individual cheese yield

Cheese yield (%)

Treatment

- S-16
- M-16
- S-8
- M-8

Legend:
- S-16
- M-16
- S-8
- M-8
Cheese yield % - van Slyke formula (semi hard cheese)

Swedish dairy goats (milking only)
- Fat: 3.4 %
- Protein: 2.9 %
- Casein: 2.1 %
- Milk yield: 2.8 kg

Cheese yield: 0.29 kg = 10.4 %

Earlier studies (MIX – systems)
- Fat: 4.9 %
- Protein: 3.2 %
- Casein: 2.3 %
- Milk yield: 2.5 kg

Cheese yield: 0.34 kg = 13.6 %

10 L of milk
- 1 kg of cheese
- 1.4 kg of cheese
Conclusions

✓ Suckling before milking increased fat content and cheese yield

✓ Oxytocin levels in plasma increased during suckling/milking but not during milking only

Last but not least.. By using MIX-systems-Animal Welfare can be improved!
Thank you for listening...