Sveriges lantbruksuniversitet
Swedish University of Agricultural Sciences

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

Högberg M*, Andrén A#, Hartmann E*, Sandberg E* & Dahlborn, K*
*Dept of Anatomy, Physiology and Biochemistry, Box 7011, # Dept of Food Science, Box 7051, SLU, 750 07 Uppsala, Sweden.

# 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

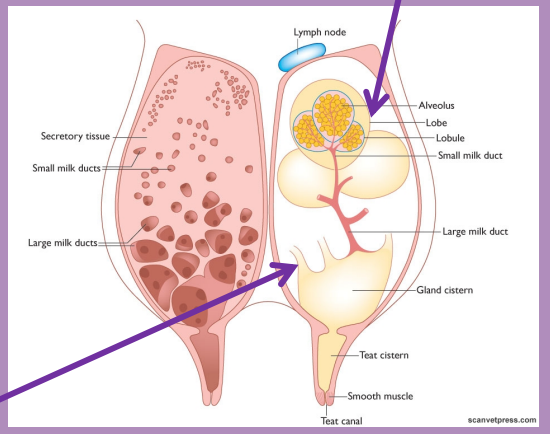
**Alveolar compartment (a*lveolar lumen and small milk ducts)***

» 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

Alveolar milk

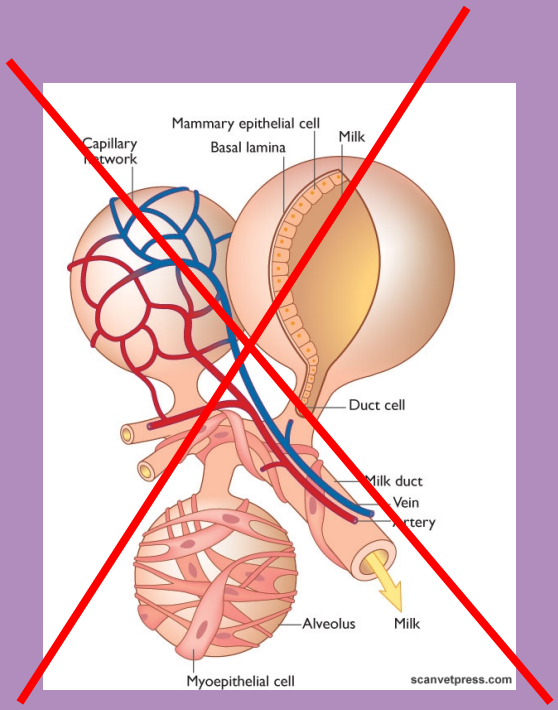



Cisternal milk

# Goats ≠ cows

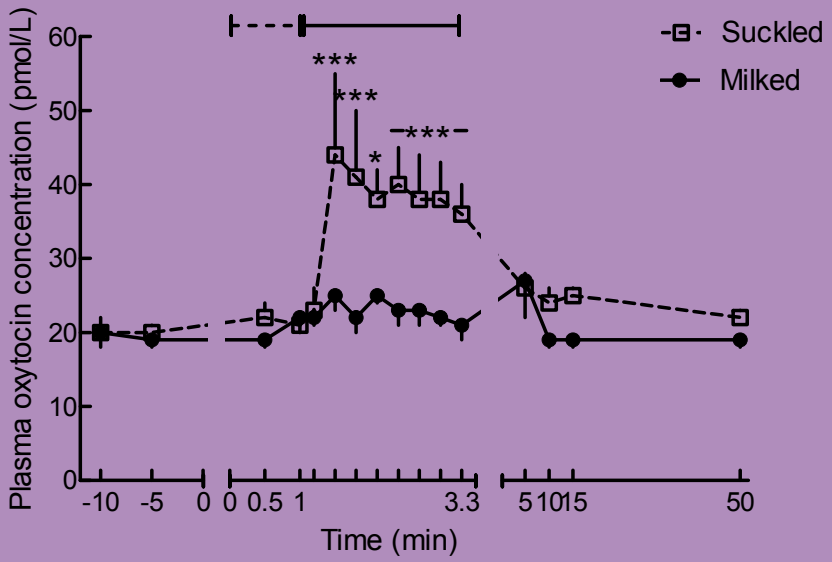
**Goats have big gland cisterns**
**Storage capacity between 40-80%**

**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




*Olsson K & Högberg M. 2008. Plasma vasopressin and oxytocin concentrations increase simultaneously during suckling in goats. Journal of dairy research 75, 1-5*

# 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**

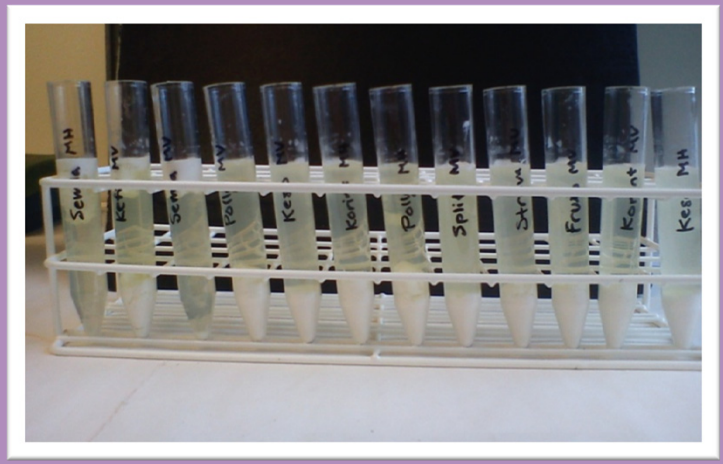
***Milk and blood sampling*:**
**before and after suckling from both teats 1 and 2;**
**+ continuously during suckling from the milked teat (=2) - until the kid stopped to suckle**

# Analyses

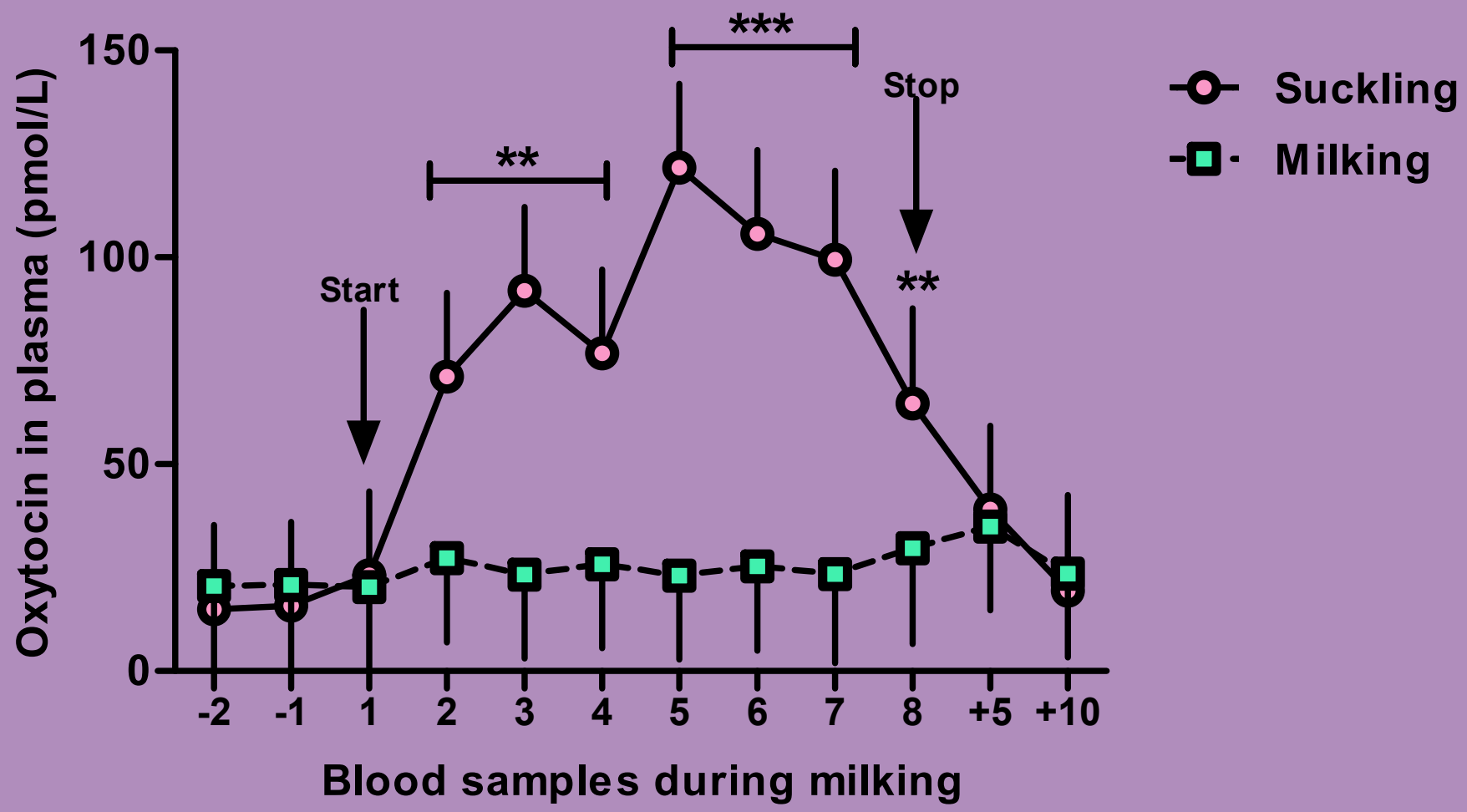
» Milk composition was analyzed in fresh milk (40°C) with an infra-red spectrometry method (MIRIS)

» Casein content was analyzed by a rennet coagulation method

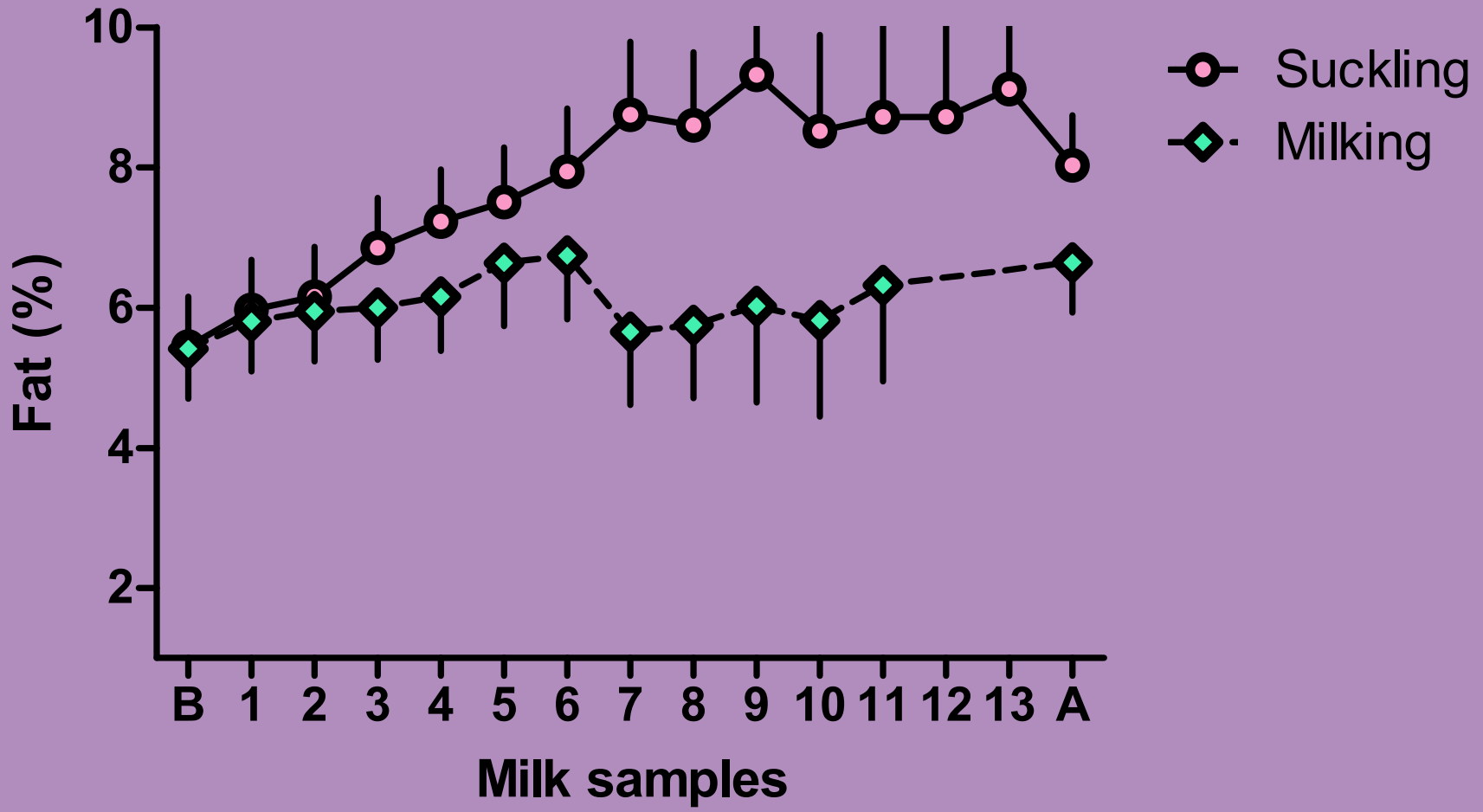
» Oxytocin was analyzed by ELISA



# Oxytocin in plasma during suckling/milking



# Fat concentration (%)



# How is the individual cheese yield affected by different suckling /milking strategies?

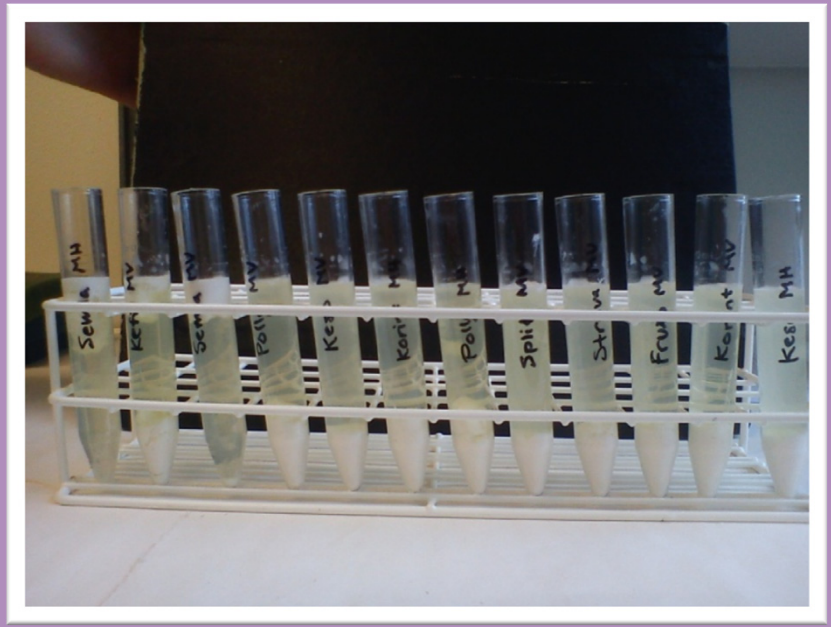
**12 lactating goats, 4 weeks, 4 treatments, cross-over design**

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

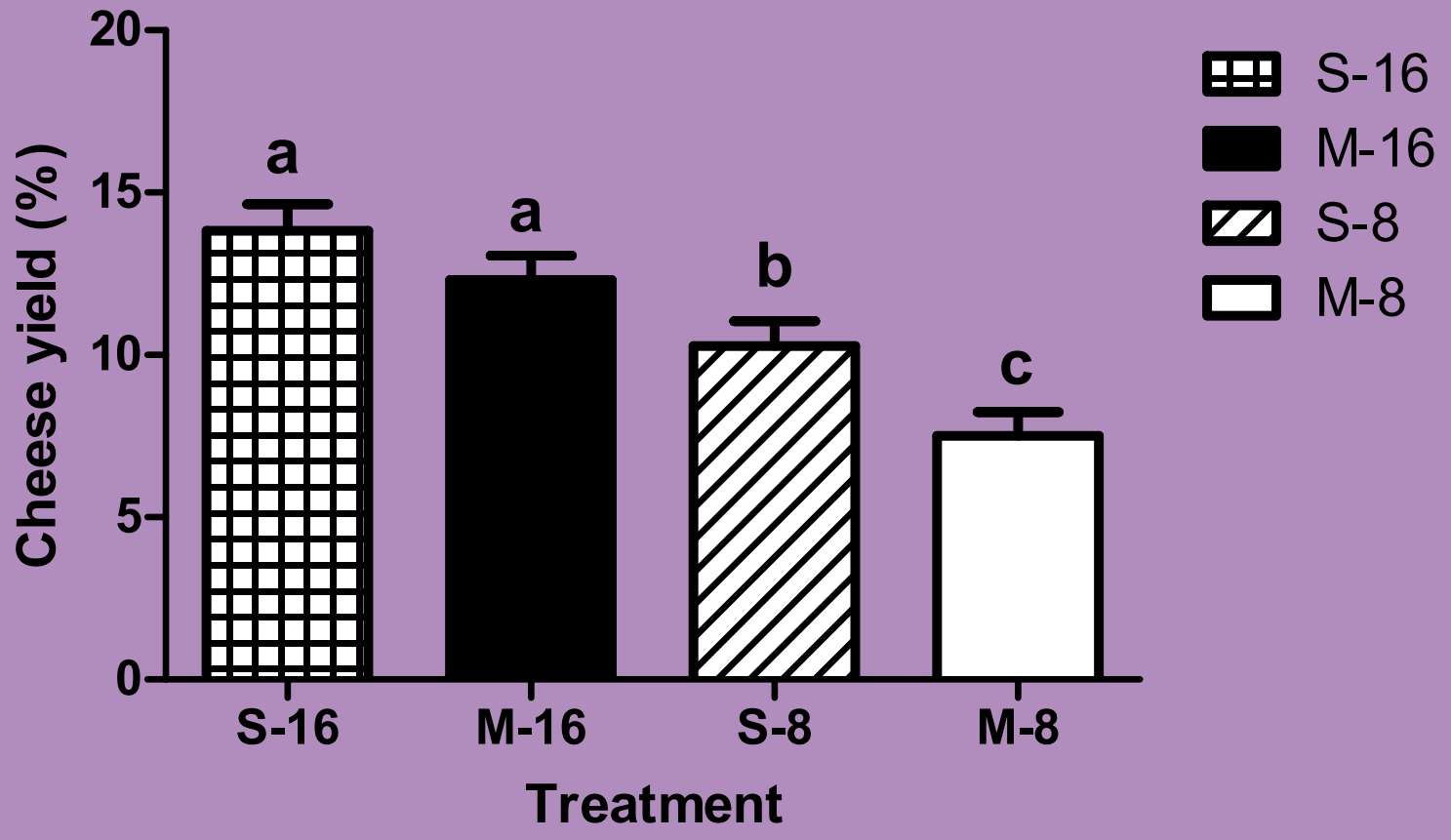
**Free suckling for 8h (1X milking)**
**Treatm.3 = Suckling before milking (S-8)**
**Treatm.4 = Milking before suckling (M-8)**

# 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 % - 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

**Earlier studies (MIX – systems)**

**Fat:** 4.9 %
**Protein:** 3.2 %
**Casein:** 2.3 %
**Milk yield:** 2.5 kg

**Cheese yield:** 0.29kg = 10.4 %

**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...