

Understanding Milk Fat and Protein Variation in Your Dairy Herd



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- Our production services cover farms' daily, annual and long-term production related issues
 - production planning
 - improving profitability
 - managing changes

Milk price in Finland

- Finland
 - Standard milk: 3,3% protein, 4,3% fat → 0,38 cnt/litre
 - Extra protein:

Is it more cost effective to produce litres or components?

[../../../../Desktop/Milk components.xlsx](#)

Can we affect milk composition?

- Factors other than nutrition:
 - Breed

Average fat and protein content of milk produced by different breeds.

| Breed | % Fat | % Protein |
|-------------|-------|-----------|
| Holstein | 3.65 | 3.06 |
| Ayrshire | 3.86 | 3.18 |
| Brown Swiss | 4.04 | 3.38 |
| Jersey | 4.60 | 3.59 |

Can we affect milk composition?

- Factors other than nutrition:
 - Stage of lactation: highest amount in colostrum, lowest point between 25 and 50 days after calving, increases at 250 days as milk production begins to decrease
 - Age: fat falls about 0.2% each year from the first to fifth lactation, protein decreases 0.02 to 0.05% each lactation as animals age
 - Season: hot, humid summer months depress fat and protein content
 - Mastitis: reduce fat but increase blood protein content of milk
 - Mechanical errors: cooling problems in the bulk tank, sampling problems, over agitation in the pipeline, water used in washing leaks to bulk tank

Can we affect milk composition?

- Nutritional factors
 - Nutrition or ration formulation changes are more strongly correlated to milk fat content than milk protein
 - Management changes made in nutrition and feeding practices are able to quickly and dramatically alter production of fat and protein
 - fat can be changed by 0.1 to 1.0 percentage points and protein 0.1 to 0.4 points

Nutritional factors

- Source of milk fat and protein
 - Digestion of fiber in the rumen produces the volatile fatty acids (VFA)
 - About half of the fat in milk is synthesized in the udder from VFA. The other half of milk fat is transported from the pool of fatty acids circulating in the blood.
 - Microbial protein is a primary source of essential amino acids for the cow → used by the mammary gland to synthesize milk proteins
 - Glucose is required to provide energy to support this protein synthesis

Nutritional factors

- Rumen function
 - The relative amounts of protein and energy is the major factor affecting rumen fermentation and therefore milk components
 - The challenge in feeding for milk components is that high energy, low fiber diets that increase milk protein are likely to reduce fat levels

Nutritional factors

- Concentrate intake
 - An increase in the intake of concentrates causes a decrease in fiber digestion → less acetic acid and more propionic acid
 - Propionic acid production encourages a fattening metabolism that is in opposition to milk fat
 - At the same time, greater propionate production allows higher milk protein levels

Nutritional factors

- Foreage level and physical form
 - For lactating cows at least 45 % of dry matter from forage
 - Low forage intake can cause a major reduction in the fat content of milk due to low fiber levels
 - Protein and fat content also can be changed due to the physical form of forage
 - Much of this is related to ration sorting → Monitor ration particle size to ensure that adequate effective fiber is provided, TMRs are mixed properly, rations are distributed evenly to all cows, and sorting is minimal.

Examples

- First herd: 33 cows, separate feeding
- Second herd: 82 cows, PMR

Results from milk recording data

| Koelypsypäivän tuotos | Kpl | Maito, kg | | R% | V% | Solut | Urea |
|----------------------------------|-------------|---------------|------------|-------------|-------------|-------------|--------------|
| | | Tot. | Tavoite | | | | |
| Lypsyssä olevat | | | | | | | |
| Karja keskimäärin | 33 | 33,0 | | 4,79 | 3,65 | 112 | 27 |
| Karja yhteensä | | 1088,2 | | | | | |
| Ensikot | 9 | 25,9 | | 5,08 | 3,74 | 88 | 26 |
| 2. lypsykausi | 7 | 30,2 | | 4,62 | 3,89 | 217 | 29 |
| Vanhemmat | 17 | 37,9 | | 4,74 | 3,54 | 86 | 27 |
| <60 pv poikimisesta | 10 | 36,7 | | 5,02 | 3,49 | 68 | 25 |
| 60-120 pv | 7 | 40,1 | | 4,17 | 3,44 | 120 | 29 |
| 121-180 pv | 2 | 36,2 | | 5,03 | 3,67 | 45 | 29 |
| >180 pv poikimisesta | 14 | 26,3 | | 4,99 | 3,97 | 163 | 28 |
| 12 viim. kuukauden tuotos | | | | | | | |
| | Lehmiä | Maitoa | Rkg | R% | Vkg | V% | EKM |
| Karja | 41,1 | 9908 | 460 | 4,64 | 358 | 3,62 | 10844 |
| - Meijerimaitoa, kg | | 9532 | | 4,69 | | 3,59 | |
| Ayrshire | 40,7 | 9935 | 460 | 4,63 | 359 | 3,61 | 10860 |
| Holstein | | | | | | | |
| Suomenkarja | | | | | | | |
| Muut rodut | 0,3 | 9551 | 568 | 5,95 | 378 | 3,96 | 12228 |

Rehunkäyttö, kg ka/eläin/pv

| | | Ryhmä | Lypsävät lehmät | | |
|---------------------------------------|--|-----------------------------------|-----------------|-------------|--------|
| | | | Suunn. | Tot. | Poikk. |
| Silage, D-Value 703 g/kg ka | | Vanha salvo 1.teko-17 | 13 | 12 | -1 |
| Grain (barley 55%, oats 45%) | | Seosvilja (ohra 55% ja kaura 45%) | 5 | 5 | -1 |
| Concentrate, CP 26,1%, Energy 13,2 MJ | | Amino-Maituri 12000 | 5,8 | 4,9 | -0,9 |
| Extra energy for fresh cows | | Aseto-Melli | 0,00 | 0,24 | 0,24 |
| Minerals | | Huippu-Namino | 0,24 | 0,22 | -0,02 |

Ravintoaineiden saanti

| | | Ryhmä | Lypsävät lehmät | | |
|----------------------|--|-------------------------|-----------------|--------------|--------|
| | | | Suunn. | Tot. | Poikk. |
| | | Yleistä | | | |
| | | ka, g/kg | 559 | 556 | -3 |
| | | ME, MJ/kg ka (lehmät k) | 11,0 | 11,0 | 0,0 |
| Concentrate level | | Väkirehun osuus | 0,47 | 0,47 | 0,00 |
| DM intake, kg DM/day | | ka-syönti, kg ka/pv | 24,05 | 21,89 | -2,16 |
| | | Valkuainen | | | |
| CP | | rv, g/kg ka | 163 | 161 | -2 |
| | | OIV, g/kg ka | 99 | 98 | -1 |
| | | Rasva | | | |
| | | Hiilihydraatit | | | |
| NDF | | Kuitu, g/kg ka | 406 | 409 | 3 |
| Strarch | | tärk, g/kg ka | 155 | 151 | -4 |

Innitial data

| | | | | | |
|--------------------------------|------|-----------------|-------|---------|------|
| Cows in herd, kpl | 33 | Maitoa, l/le/pv | 33,00 | | |
| Milk price, snt/litre | 38 | Rasva-%: | 4,30 | Valk.-% | 3,30 |
| fat and protein price, cnt/0,1 | 0,25 | 0,7 | | | |

Affect of milk component changes to milk price

(standart milk: fat 4,3 % and protein 3,3 %)

| | Standart price | Farms results | Diference |
|------------------------|----------------|---------------|-----------|
| Milk for dairy, l/day | 33,00 | 33 | 0 |
| Maidon fat content-% | 4,30 | 4,79 | 0,49 |
| Milk protein content-% | 3,30 | 3,65 | 0,35 |
| Milk price snt/litre: | 38 | 41,675 | 3,675 |

Milk profit in herd

| | Standart price | Farms results | Diference |
|-------------------------|----------------|---------------|-----------|
| in one week, euro/herd | 2 897 | 3 177 | 280 |
| in one month, euro/herd | 12 415 | 13 615 | 1 201 |
| in one year, euro/herd | 151 044 | 165 652 | 14 608 |

Results from milk recording data

| Koelypsypäivän tuotos | Kpl | Maito, kg | | R% | V% | Solut | Urea |
|----------------------------------|-------------|---------------|------------|-------------|-------------|-------------|--------------|
| | | Tot. | Tavoite | | | | |
| Lypsyssä olevat | | | | | | | |
| Karja keskimäärin | 82 | 34,1 | | 5,29 | 3,50 | 196 | 29 |
| Karja yhteensä | | 2799,0 | | | | | |
| Ensikot | 27 | 30,4 | | 5,58 | 3,51 | 95 | 28 |
| 2. lypsykausi | 22 | 35,2 | | 5,31 | 3,56 | 146 | 32 |
| Vanhemmat | 33 | 36,5 | | 5,08 | 3,46 | 297 | 28 |
| <60 pv poikimisesta | 30 | 37,7 | | 5,30 | 3,26 | 202 | 26 |
| 60-120 pv | 12 | 39,0 | | 5,30 | 3,26 | 232 | 28 |
| 121-180 pv | 9 | 34,7 | | 5,26 | 3,50 | 313 | 32 |
| >180 pv poikimisesta | 31 | 28,7 | | 5,28 | 3,92 | 129 | 32 |
| 12 viim. kuukauden tuotos | | | | | | | |
| | Lehmiä | Maitoa | Rkg | R% | Vkg | V% | EKM |
| Karja | 92,6 | 10983 | 508 | 4,63 | 393 | 3,58 | 12058 |
| - Meijerimaitoa, kg | | 10229 | | 4,33 | | 3,55 | |
| Ayrshire | 13,7 | 10314 | 504 | 4,89 | 376 | 3,65 | 11691 |
| Holstein | 74,0 | 11069 | 506 | 4,57 | 395 | 3,57 | 12070 |
| Suomenkarja | | | | | | | |
| Muut rodut | 4,9 | 11555 | 552 | 4,78 | 419 | 3,63 | 12904 |

Rehunkäyttö, kg ka/eläin/pv

PMR: Silage (D-value 683 g/kg ka) 62 %, rape seed 7 %, grain 30 %, salt, minels, Optigen II

Feed from robot, CP 20,5%, energy 12,9 MJ/kg ka

| Ryhmä | Lypsävät lehmät | | |
|------------------------------------|-----------------|------|--------|
| | Suunn. | Tot. | Poikk. |
| 26.09.17 Pv-laskelman seos 5,103tn | | 23 | |
| Auto-Krossi 2 | | 2,0 | |

Ravintoaineiden saanti

| Ryhmä | Lypsävät lehmät | | |
|---|-----------------|-------|--------|
| | Suunn. | Tot. | Poikk. |
| Yleistä | | | |
| ka, g/kg | | 455 | |
| ME, MJ/kg ka (lehmät k) | | 10,7 | |
| Consentrate level % Väkirehun osuus | | 0,45 | |
| DM intake, kg DM/day ka-syönti, kg ka/pv | | 25,50 | |
| Valkuainen | | | |
| CP rv, g/kg ka | | 183 | |
| OIV, g/kg ka | | 94 | |
| Rasva | | | |
| Hiilihydraatit | | | |
| NDF Kuitu, g/kg ka | | 407 | |
| Starch tärk, g/kg ka | | 179 | |

| | | | | | |
|---|-----------------------|----------------------|------------------|---------|------|
| Innitial data | | | | | |
| Cows in herd, kpl | 82 | Maitoa, l/le/pv | 30,00 | | |
| Milk price, snt/litre | 38 | Rasva-%: | 4,30 | Valk.-% | 3,30 |
| fat and protein price, cnt/0,1 | 0,25 | 0,7 | | | |
| Affect of milk component changes to milk price | | | | | |
| (standart milk: fat 4,3 % and protein 3,3 %) | | | | | |
| | Standart price | Farms results | Diference | | |
| Milk for dairy, l/day | 34,00 | 34 | 0 | | |
| Maidon fat content-% | 4,30 | 5,29 | 0,99 | | |
| Milk protein content-% | 3,30 | 3,5 | 0,2 | | |
| Milk price snt/litre: | 38 | 41,875 | 3,875 | | |
| Milk profit in herd | | | | | |
| | Standart price | Farms results | Diference | | |
| in one week, euro/herd | 7 416 | 8 172 | 756 | | |
| in one month, euro/herd | 31 783 | 35 024 | 3 241 | | |
| in one year, euro/herd | 386 696 | 426 128 | 39 433 | | |

Take home message

- Good value of silage is the most important nutritional factor affecting DM intake → milk production and milk components
 - regular forage tests for energy, minerals and protein
 - regular tests of TMR and concentrates to see if they meet herd requirements
- Take good care of you cows → all diseases (lamenes, rumen acidosis, ketosis...) reduce drymatter intake

Thank you!



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ProAgria Keskusten ja ProAgria Keskusten Liiton johtamisjärjestelmälle on myönnetty ryhmäsertifikaatti