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There are many factors which can influence the composition of milk, of which water, fat, protein, lactose and minerals are the major components. Butterfat and protein concentrations in milk can be affected by nutrition and manipulated by dietary methods.

General Factors Affecting Milk Solids

1. Genetics
Channel Island Breeds have higher milk solids, Ayrshires have intermediate milk solids and Holstein relatively poor milk solids. BUT there is a considerable variation between breeds.

2. Disease
Mastitis and Liver Fluke can depress milk protein levels Acetonaemia, Ketosis and Fatty Liver and energy problems in early lactation can lead to high levels of butterfat entering the milk

3. Stage of Lactation
Lactose concentration in milk tends to be stable whereas butterfat and protein tend to decrease as milk yield increases, mainly due to dilution.

4. Age
Milk solids tend to decrease as an animal gets older, again due to dilution as yields increase

Butterfat
50% is synthesised from volatile fatty acids (butyrate and acetate) from the rumen, which is produced by the optimum digestion of fibre.

Milk butterfat levels can be altered by increasing the amount of effective fibre in the ration such as 0.5kg chopped straw/cow/day, or 2-3kg good quality hay or haylage. Spring grass with poor levels of fibre leads to low butterfat levels.

Feeding high levels of concentrates can increase propionate and decrease acetate production, therefore leading to a drop in butterfat levels. Avoid sudden diet changes and 'slug' feeding of parlour concentrates.

Feeding yeast will help modify rumen fermentation and reduce sub-acute ruminal acidosis.

Unsaturated fatty acids are toxic to rumen microbes as they are converted into saturated fatty acids in the rumen via biohydrogenation. Saturated fatty acids are absorbed into the body and contribute to milk fat synthesis.

Diets which are high in polyunsaturated fatty acids, such as lush spring grazing, alter the environment of the rumen. This subsequently produces fatty acid intermediates such as isomers of conjugated linoleic acid. These are absorbed into the bloodstream and result in downregulation of key enzymes which are involved in milk fat production in the udder. This in turn leads to the depression of fat production. It is advisable to reduce intakes of grazed grass by offering buffer feed with conserved forages.

Butterfat percentage can be improved by treating and protecting rumen degradation, through the use of fat supplements, saturated and high in C16 palmitic acid. Do not exceed 6% inclusion, as this may reduce dry matter intakes.

Milk Protein

Precursors are proteins from body reserves and from dietary protein (microbial and DUP). On a forage-based ration at normal milk yields, the majority of protein is obtained from microbial protein, and this is dependent on the energy content of the diet (FME sources and forages). Usually milk proteins reflect long term energy status.

A requirement when aiming to increase milk protein is ensuring good energy intakes. Milk protein will increase by 0.03% with every extra 10MJ ME fed. Occasionally, dietary protein may be limiting, and will therefore depress milk protein production.

Milk protein can be increased with forage changes, concentrate changes and good dry cow management. Forage changes include maximising DMI in early lactation to avoid any negative energy balance; using a mixture of forages to stimulate intakes; and feeding higher levels of maize silage.

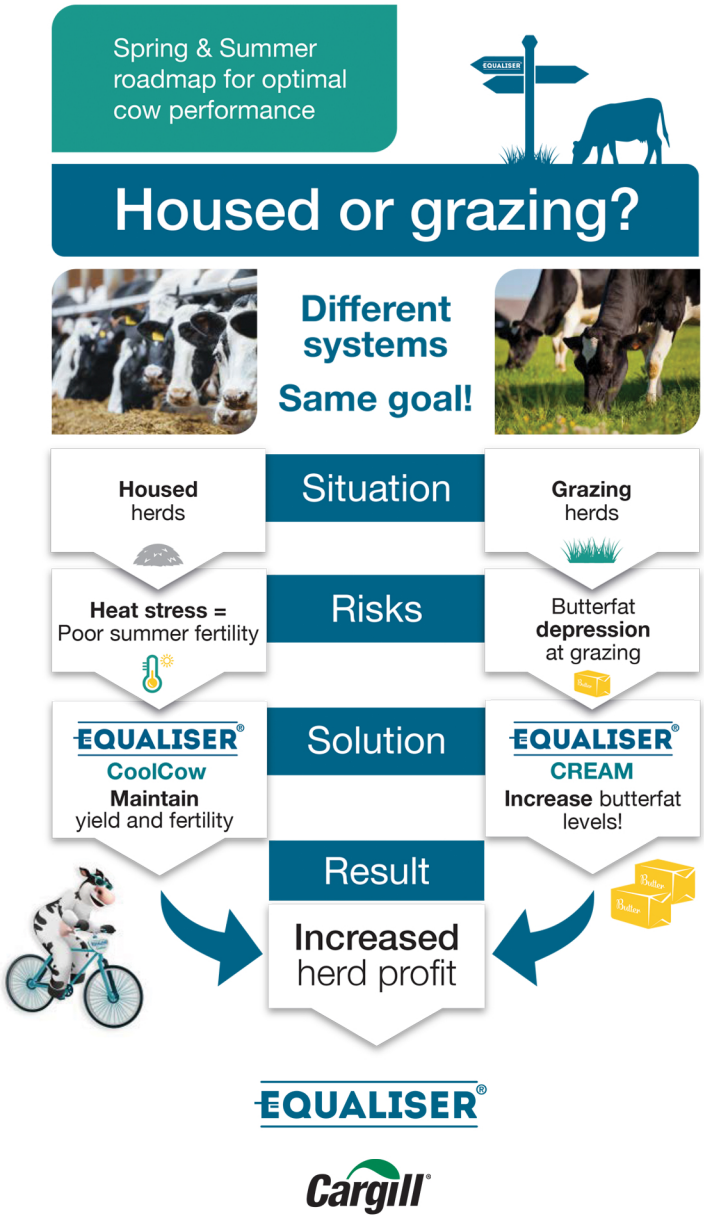
Concentrate changes include increasing the level of rumen degradable starch in the diet (wheat or barley) as this increases FME and optimises rumen microbial protein synthesis; feeding by-pass starch (maize grains and by-products) with increasing energy supply to the cow; and increasing DUP, but only if dietary protein is limiting. Increasing DUP can also increase milk and exacerbate energy problems, so it is advisable to feed low protein concentrate to cows on lush grass.

Dry cow management involves controlling body condition score to maximise DMI and reduce negative energy balance and body condition loss in early lactation. Extra DUP in the dry cow can also help milk protein levels.

Responses to dietary changes to increase milk protein levels are slow and may take months depending on the genetics of the cows involved.

Milk Fatty Acid Content

Feeding diets with rapeseed meal and linseed meal will reduce saturated fatty acids in milk by 15% and also increases beneficial cis-monounsaturated fatty acids from 20-33%. Grazed grass has similar effects. Breed and genetic variations are substantial.



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