

CALF MILK REPLACERS

Skim and whey-based, what's the difference?



A Calf Milk Replacer (CMR) can be skim- or whey-based. The protein in skim-based CMR is casein. In whey-based CMR the protein sources are albumin and globulin.

The choice of CMR type will largely depend on the rearing system and producer's objectives.

A skim-based CMR includes a high proportion of skim ingredients originating from milk processing, for example:

- Whole milk powder
- Skim milk powder
- Butter milk powder
- Casein fat-filled milk powder

These are all classified as skim milk powder on the CMR label.

A whey-based CMR includes whey ingredients originating from whey processing, for example:

- Whey powder
- Delactosed whey
- Whey permeate
- Whey protein concentrate

These are all classified as whey milk powder on the CMR label.

Ingredients

Dairy ingredients making up skim-based or whey-based CMR vary in source and nutrient contribution (e.g. protein, fat, lactose and ash), and are used in varying proportions to achieve the overall nutrient analysis of the CMR.

The difference

Both skim- and whey-based calf milk replacers include the required amount of amino acids to meet the calf's requirement and there should be no difference in performance in average daily gain, starter feed intake and feed conversion efficiency of calves reared on either type of CMR.

The key difference is that the casein in skim-based CMR coagulates in the abomasum forming a clot/curd, whereas the albumin and globulin in whey-based CMR remain as a liquid in the abomasum.

A skim-based product may suit:

- ✓ Producers preferring to feed a milk akin to maternal whole milk.
- ✓ Producers requiring calves with a visible 'bloom', which may be desirable if selling calves at two to three weeks old.
- ✓ In less than ideal rearing situations, for example where there are environmental, management and sanitary challenges, or loose manure due to digestive problems.

A whey-based product may suit:

- ✓ Where a lower cost CMR is required.
- ✓ In an ideal environment with few management, hygiene and disease challenges.
- ✓ Combined dairy and beef rearing systems.





Buying advice

The source of skim and whey ingredients used in the CMR should always be checked. Labels are often general, and the quality of the raw materials making up skim- or whey-based CMR or the proportions they represent in a milk replacer will not be disclosed. Neither will the label reveal how they have been processed, dried or manufactured. Therefore, use a trusted supplier and check these details carefully.

Skim-based CMR

The casein in skim-based CMR coagulates in the abomasum, firstly by the enzymes rennin and pepsin and then by hydrochloric acid. It forms a curd that is slowly digested in the abomasum for approximately six hours. Nutrients are slowly released from the abomasum.

A minimum skim content is required in a skim-based CMR, as casein curd formation is highly dependent on the **quantity** and **quality** of skim milk powder. A skim-based CMR product with a minimum skim content of 18%, as shown in Figures 1 and 2, is preferable to achieve a firm curd/clot.

Research has shown that the same growth rate can be achieved with 30% skim versus 60% skim, but only where a high-quality skim is used. There are several skim-based calf milk replacers on the market that contain varying levels of skim content ranging between 10% to 60%. But remember, skim ingredients come from different sources and are of varying quality, so it's worth checking both the amount and source of the skim in your calf milk replacer.

Whey-based CMR

The albumin and globulin in whey-based CMR do not form a clot/curd in the abomasum. They remain as a liquid in the abomasum for a shorter time; between one and two hours, before moving to the small intestine for further digestion and nutrient utilisation.

Practical tips for Calf Milk Replacer feeding:

- ✓ Use a trusted supplier and choose a quality product.
- ✓ Consider the calf rearing system and production objectives.
- ✓ Consider the environmental challenges in the calf unit.
- ✓ For skim-based CMR, ensure a skim milk content of at least 18%.
- ✓ Maintain a routine by feeding at the same time every day for once a day, twice a day and three times a day feeding systems.
- ✓ Ensure good sanitation and maintenance of feeding equipment.
- ✓ Follow the mixing and water temperature instructions on the milk replacer bag carefully.
- ✓ Ensure milk is mixed to the correct concentration and volume as underfeeding or overfeeding may induce nutritional scours and bloat.
- ✓ Provide *ad-libitum* fresh calf starter and clean water daily.
- ✓ Manage weaning to avoid a slump in growth rate post-weaning.



Figure 1: A good clot will form when using a good quality skim, in the right quantity.

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Figure 2: Clot formation will be poor if skim quantity is low, and/or quality is not good.