Section 3

The **Liquid Diet**

Introduction

The primary goal of the rearing phase is to double the birth weight of the calf by 56 days of age. Good nutrition is fundamental to animal health, welfare and productivity. The liquid diets available for calf feeding are colostrum, transition milk, whole milk and milk replacer. Colostrum must be given for the first feed followed by transition milk for the first two to four days of life.

1. **What is transition milk?**
2. **What should follow the transition milk feeding phase?**
3. **How much milk does a calf need?**
4. **What is meant by 'waste milk'?**
5. **What factors contribute to the microbial load in milk?**
6. **What affect does pasteurisation have on milk fed to calves?**
7. **Do antibiotic residues in milk affect calf performance?**

The Liquid Diet

1 What is transition milk?

Transition milk is the milk following colostrum, i.e. milkings two to eight. This milk is non-saleable and is commonly given to calves for the first few days of life.

2 What should follow the transition milk feeding phase?

The type of liquid feed given to calves following colostrum and transition milk feeding depends on the farm targets, milk price, milk availability, disease status of the farm and labour availability.

Whole milk is the natural follow-on liquid and can be offered until the calf is seven to 14 days of age. The calf is then usually changed over to milk replacer. If available, farmers may choose to feed whole milk to calves until weaning. Calves can also be moved straight to milk replacer following transition milk feeding.

If available, whole milk can be fed to calves up to weaning.

3 How much milk does a calf need?

- At least four feeds of transition milk. This can improve calf health.
- Calves require 10-13% of their birth bodyweight in milk for the first week, and this rises to 13-15% of their birth bodyweight in milk thereafter (e.g. six litres for a 40kg calf).
- Calves fed 15% of BW in milk:
    - Achieve heavier weights at both the end and beginning of the pre-weaning phase.
    - Reach weaning weights earlier.

Liquid feeds	
Colostrum	Must be fed to the calf. Three litres within first two hours of life.
Transition milk	Milk that follows colostrum, 2nd to 8th milking. Calf should receive four feeds. Contains higher levels of antibodies compared to whole milk. Must be stored correctly to minimise bacterial count.
Whole milk	Natural follow on diet for calves. Feeding high levels during the milk feeding phase can increase growth rates. Consistency of whole milk can vary and, where hygiene is poor, bacterial growth can be an issue.
Milk Replacer (MR)	Milk replacer provides increased biosecurity to a farm, especially where Johne's disease is a problem. It is essential that MR is fed and mixed correctly in order to avoid health issues and inferior growth.
Waste milk	Waste milk is often used on farms to feed calves. However it can contain a high bacterial load.

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4 What is meant by 'waste milk'?

Waste milk is milk produced by dairy cows that is unsaleable due to insufficient quality (i.e. mastitis) or due to the presence of antibiotic residues. Waste milk is sometimes fed to calves rather than being discarded.

5 What factors contribute to the microbial load in milk?

The microbial load in milk is a function of several factors including:

- The natural microbial content of milk produced by the cow.
- The cleanliness of the equipment used to collect the milk.
- The cleanliness of the equipment used to store the milk before feeding.
- Storage time (time from collection to feeding).
- Temperature during storage.
- Exposure to microbial sources (faeces, flies, etc.) in the environment.
- Pasteurisation.

Organisms such as *Streptococcus, Staphylococcus,* Enterobacter, *E.coli, Listeria, Salmonella,* BVD and BIV have all been identified in milk.

If milk is stored at, or above, room temperature the microbial content increases. This can be problematic if milk collected at morning milking is not fed until the afternoon. This increases the microbial load dramatically and poses a disease threat to calves.

6 What affect does pasteurisation have on milk fed to calves?

Pasteurisation is an effective means of reducing the microbial load of milk and improving overall milk quality. Some benefits of pasteurising milk include higher mean bodyweight gain, reduced mortality and decreased veterinary costs. However, although pasteurisation reduces the microbial load, it is not sterilization and a heavy bacterial load in milk will not be completely eliminated by the process. In addition, it does not remove potential antibiotic contamination. The costs of collecting milk, pasteurising and storing milk before and after pasteurisation must be evaluated before a producer considers installing pasteurisation equipment.

7 Do antibiotic residues in milk affect calf performance?

Milk containing antibiotic residues can be unpalatable with high rejection rates by calves. This results in poor calf growth. In addition, faecal *E.coli* samples monitored for antibiotic resistance have been found to be significantly higher in calves fed milk containing antibiotics than saleable milk from the bulk tank, whether it was pasteurised or not.