Calves are expected to achieve weaning growth goals sooner, have better immune development and grow more efficiently. These expectations are beyond what whole milk alone can provide. Incorporating new technologies into the existing total mixed ration (TMR) diet can help. It’s time to look at whole milk through the same lens to help your calves get the right nutrition at the right time, every time.

**Three ways to supplement whole milk**

1. **Fortify**
   - Fortify core additives such as vitamins and minerals to bring whole milk nutrition content in line with NRC guidelines. Other options include addinglinenoic fatty acids, cholesterol and desiccated blood serum for protection against conditions.

2. **Balance**
   - Balancer products are designed to add a higher level of protein while using a minimal amount of fat to dilute out the total fat content of milk. This helps promote healthy growth. The addition of a balancer can be used to adjust the total solids level and reduce a batch of whole milk. Balancer are fortified with vitamins and minerals, but may contain coccidiostats and larvacides for disease and pest control.

3. **Extend**
   - The supply of whole milk can vary considerably and extenders can be used with the primary objective of increasing the liquid milk volume. Extenders, which are commonly complete, non-medicated milk replacers, contain vitamins and minerals, but the significance is limited by inclusion rate. When using extenders, these are not a focus on changing total solids or protein fat ratio.

**Contact your nutrition consultant for solutions**

To bring your whole milk to the next level.

**Whole milk makes a good thing better**

Nearly half of all dairy calves raised in the United States are fed a diet that includes whole milk in the preweaned stage. The source of this nutrition is primarily waste milk, salable milk, or a combination that may include milk replacer.

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Why whole milk isn't enough

CONTAMINATION RISKS
Recognizing the potential risk of introducing pathogenic bacteria and viruses to calves via waste milk, many operations now pasteurize their waste milk before feeding it. While pasteurization can address disease prevention goals for feeding whole milk, it may not satisfy a growing emphasis on mineral and vitamin content.

**Sources of Contamination**

- Pre-pasteurization contamination (e.g., Mycoplasma bovis)
- Post-pasteurization handling
- Pre-pasteurized waste milk

**Pathogens of Concern**

- Salmonella spp.
- E. coli
- Mycobacterium paratuberculosis

*(Selim and Cullor, 1997)*

**Bacterial Count in Some Common Calf Liquid Feeds**

<table>
<thead>
<tr>
<th>Bacterium</th>
<th>Commercial Dairy</th>
<th>Milk Replacer</th>
<th>Bulk Tank Milk</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Lactobacillus</em></td>
<td>10^6 CFU/g</td>
<td>10^5 CFU/g</td>
<td>10^2 CFU/g</td>
</tr>
<tr>
<td><em>Staphylococcus</em></td>
<td>10^5 CFU/g</td>
<td>10^4 CFU/g</td>
<td>10^2 CFU/g</td>
</tr>
</tbody>
</table>

*(Selim and Cullor, 1997)*

**FORTIFY TO FILL WHOLE MILK GAPS**

Even though levels in waste milk were consistent, they are not ideal for optimal growth. Optimal levels of protein and mineral requirements vary perage per year in the past, but in the last two decades, a higher risk on the health basis is resulted in. A great guideline is a ratio for systems to be greater than or equal to 1; otherwise, more than protein than fat. As a result, target systems are around 4:4 (e.g., 120:120) which is especially important in extensive nutrition programs that feed powered calves at a higher plane of nutrition.

**Whole Milk May Not Meet the NRC and USDA Requirements for the Calf**

<table>
<thead>
<tr>
<th>Trace Minerals</th>
<th>Whole Milk</th>
<th>Milk Replacer</th>
<th>Bulk Tank Milk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron</td>
<td>10%</td>
<td>60%</td>
<td>70%</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>10%</td>
<td>60%</td>
<td>70%</td>
</tr>
<tr>
<td>Zinc</td>
<td>51%</td>
<td>60%</td>
<td>70%</td>
</tr>
</tbody>
</table>

*(Selim and Cullor, 1997)*

**Nutrient Variation of Waste Milk**

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>NRC</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein, %</td>
<td>3.51</td>
<td>2.69-5.10</td>
</tr>
<tr>
<td>Fat, %</td>
<td>2.00</td>
<td>1.74-4.70</td>
</tr>
<tr>
<td>Protein, %</td>
<td>2.81</td>
<td>2.54-4.08</td>
</tr>
<tr>
<td>Fat, %</td>
<td>2.42</td>
<td>2.23-3.47</td>
</tr>
</tbody>
</table>

*(Selim and Cullor, 1997)*

**Balance for Consistent Nutrition**

The very nature of waste milk makes it a product that can be inconsistent from day-to-day and farm-to-farm. It typically is made up of milk that is contaminated, sick or bricked milk. Due to the lack of safety controls in higher milk protein and total solids, and sometimes whole milk, a large variation in milk is noted after the nutritional calibr of the batch. In other hands, a wide range of variation, with other variations could result in milk from milk in martens. Paral management and/or pasteurization can result in some factors. Although these samples to add milk replacer to add milk replacer to add milk replacer, the peak of the milk.

**Nutrient Mean Range**

<table>
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*(Selim and Cullor, 1997)*

**Additional Protection**

Producers can use protective measures, such as acaricidal and/or larvicidal agents, pest control, and pest management practices, to prevent milk replacer from being eaten by other calves.

**Daily Percentage of Waste Milk**

<table>
<thead>
<tr>
<th>Waste Milk</th>
<th>Total Milk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole milk</td>
<td>100%</td>
</tr>
<tr>
<td>Milk replacer</td>
<td>10%</td>
</tr>
<tr>
<td>Bulk tank milk</td>
<td>5%</td>
</tr>
</tbody>
</table>

*(Selim and Cullor, 1997)*

**Did you know**

- Whole milk is the only milk that contains all vitamins, minerals, and protein.
- Whole milk contains all essential nutrients.
- Whole milk is a natural source of probiotics.
- Whole milk is the only milk that contains all essential fatty acids.
- Whole milk is the only milk that contains all essential amino acids.

**Addendum:**

- Whole milk is the only milk that contains all essential nutrients.
- Whole milk is the only milk that contains all essential fatty acids.
- Whole milk is the only milk that contains all essential amino acids.
- Whole milk is the only milk that contains all essential vitamins.
- Whole milk is the only milk that contains all essential minerals.

**Conclusion:**

Whole milk is an excellent source of nutrients for calf nutrition. However, the variability in milk replacers makes it difficult to meet the nutrient requirements of calves. Feeding whole milk can be an effective strategy to meet these needs.