

## Feeding and Care of Orphaned Foals

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Orphaned foals can survive with intensive management in the first 24 hours. This NebGuide includes recipes for emergency milk replacements and care recommendations for the early weeks.

Feeding and raising orphaned foals can be an extreme challenge, particularly if the foal was orphaned at birth (*Figure 1*). Losing a mare is never expected and being left with a motherless orphan can turn into an unexpected nightmare. Intensive management will optimize the foal's survival chances.

### First 24 Hours — Ensuring Immunity

The primary concern for a foal orphaned at birth is that it has received sufficient antibodies through the mother's milk shortly after birth. A mare's first milk, or colostrum, contains a high concentration of immunoglobins (antibodies) to protect the foal from disease and infection. Colostrum is secreted by the mare during the first 24 to 48 hours following parturition. There is no placental transfer of antibodies during pregnancy from mare to fetus, thus the foal is born without any protection from disease.

The ingestion of colostrum by the newborn allows for passive transfer of immunoglobulins, which provide almost immediate immunity to the foal. Foals which do not receive these antibodies are at high risk and are diagnosed as having a condition known as failure of passive transfer (FPT).

Maximum gastrointestinal tract absorption of colostrum begins to decrease after 12 hours, with minimal absorption occurring 24 hours after birth. Ideally a foal should receive 250-300 ml of colostrum every one to two hours for the first six hours after birth. If failure of passive transfer is diagnosed in the first 6 to 12 hours after birth, colostrum is often bottle fed or administered via stomach tube by a veterinarian. A total of approximately two to three liters of colostrum should be divided into three to four doses given at hourly intervals.

If no colostrum is available, a purified, freeze-dried immunoglobulin is available. The lyophilized colostrum can be given either orally or intravenously. Foals that do not receive sufficient colostrum within the first 24 hours can receive two to four liters of blood plasma intravenously. Normal equine



**Figure 1.** Early intensive management can optimize the chance of an orphaned foal surviving.

plasma may be purchased commercially (Foalimmune, Lake Immunogenics, Inc., Ontario, NY; Equine Plasma, Veterinary Dynamics, Inc. Chino, CA) for over \$100 per liter and intravenous infusion should be done under veterinary supervision. Plasma may be prepared locally if an acceptable donor horse and equipment are available. Without either colostrum or plasma, foals will have insufficient antibody protection and will most likely succumb to infection.

From 12 to 36 hours after birth, evaluation of the serum antibody level (IgG) in the foal is recommended. "Failure of passive transfer" (FPT) is defined as an inadequate level of antibodies or an IgG below 200 mg/dl at 24 hours of age. Foals having 200-400 mg/dl are considered to be in partial failure of passive transfer. Adequate levels of IgG range from 400-800 mg/dl. University of Florida studies have shown that foals with total FPT (no antibody protection) have a 75 percent chance of becoming ill. Foals with partial FPT have a 50 percent chance of becoming ill. A level of 400 mg/dl is usually adequate for a foal which has had normal delivery, is in good health, and is in a relatively clean environment.

A foal's serum IgG levels can be checked within 24 hours of birth. The two most common tests are the (CITE) test and Zinc Turbidity IgG Quantitative Analysis. These tests are available from veterinarians and require a small blood sample. Regardless of the test, an IgG level of more than 800mg/dl is considered adequate.

## Collection and Storage of Colostrum

Colostrum can be collected from mares post-foaling when sufficient amounts are present. It has been shown that 200 to 500 ml can be milked from such a mare without compromising antibody passage to her own newborn foal. Additionally, if a mare is at risk of dying, colostrum should be harvested from her before she dies. Colostrum can be frozen and has a shelf life of one year. Stored colostrum should be thawed at room temperature just before use. Do not thaw by microwave as essential antibodies can be destroyed.

Large broodmare farms routinely collect colostrum and freeze it to maintain a “colostrum bank” in case of emergency. Use a colostrometer (Lane Manufacturing) to measure the amount of antibodies in the colostrum. The colostrometer measures the specific gravity of a milk sample: the higher the specific gravity, the larger the concentration of immunoglobins. Normal colostrum should have 1,500 to 5,000 mg/dl of immuno-globulin IgG.

## Feeding Program

Once sufficient immune protection has been established, some type of continued nutritional plan must begin. Normally, foals nurse up to 17 times an hour during the first week of life. Nursing frequency decreases to three times per hour in the next few weeks of life. There are two basic options to provide sufficient nutrition to the orphaned foal — use a nurse mare or goat, or manually feed the orphaned foal.

## Nursing Substitute

Obtaining a nurse mare would generally be highly desirable as it would greatly reduce labor. Unfortunately, in Nebraska, nurse mares can be hard to find. Another potential problem includes convincing the nurse mare to accept the foal. Another option is to buy a milk-producing goat and use its milk. Some orphan foals have been fostered onto nanny goats with minimal restraint. These goats can be placed on hay bales or platforms so the foal can nurse. As the foal grows, the goat may not provide enough milk and supplemental feed is required.

## Bottle Feeding

Most commonly, however, an intensive manual feeding program is developed. Initially, foals should be bottle fed either mare’s milk, goat’s milk, or a powdered mare’s milk replacer ration. Many mare’s milk replacer powders are commercially available. *Table 1* lists recipes for homemade milk replacers. Mare’s milk replacers are preferred over milk replacers for other species. Fresh cow’s milk (whole) should be avoided. It has nearly twice as much fat content and only two-thirds the sugar content of mare’s milk and generally causes loose stools in foals. Low-fat cow’s milk (2% fat) can be substituted for mare’s milk if 20 g dextrose is added per liter. This mixture should be fed to a total volume of 10 percent of the foal’s weight at one day of age and increased to 25 percent of the foal’s body weight from day 10 through weaning.

## Milk Replacer for Foals

Commercial milk replacer may not always be available when needed or may be too costly for some owners. Below are several recipes for homemade milk replacers.

Formulas are to be used for a short period, when commercial mare milk replacers are unavailable (*Table 1*).

**Table 1. Recipes for homemade replacements for mare’s milk.**

<b>Formula 1<sup>a</sup></b>	24 oz 12 oz 4 tsp	cow’s milk saturated lime water dextrose <sup>b</sup>
<b>Formula 2</b>	4 oz 4 oz 1 tsp	evaporated milk warm water white corn syrup <sup>b</sup>
<b>Formula 3</b>	8 oz 1 tsp	2% cow’s milk white corn syrup <sup>b</sup>
<b>Formula 4</b>	3.5 qts 3.5 qts 10 oz 10 oz 2 oz	cow’s milk water wheat flour ground malt potassium bicarbonate
<sup>a</sup> Preferred formula. <sup>b</sup> Table sugar may produce diarrhea and should be avoided.		

When bottle feeding, a lamb’s nipple is preferred over a calf’s nipple, and small, frequent feedings are optimal. Very weak foals can be fed initially via nasal gastric tube (stomach tube) by a veterinarian. Foals will begin to consume solid feed within a few weeks and should have access to grain and grass or hay.

## Controlling Diarrhea

A common problem with feeding orphaned foals is diarrhea. Controlling this involves manipulating the three components of a feeding program:

1. amount of milk fed per day
2. dilution rate of the mixture
3. number of feedings offered per day

## Amount to Feed

Mares are large milkers and can produce as much as 3 percent of their body weight in milk per day. A suckling foal will consume as much as 30 pounds of milk in a 24-hour period. Foals can consume up to 25 percent of their body weight per day of a dilute milk replacer without risk of diarrhea. For example a 100-pound foal could consume 25 pounds of milk or 50 cups per day. Foals can easily be taught to drink from a bucket at a very young age. This reduces labor and allows the foal to consume the milk needed.

## Frequency of Feedings

The number of feedings per day can affect the growth rate of an orphaned foal. The more frequently fed, the more optimal the growth rate. Foals will nurse most frequently the first week. Feeding frequency can decrease from every one to two hours the first week to every four to six hours after the second week. Within a few weeks of life, foals will begin solid feed, decreasing the need for feedings. However, large, twice-daily feedings generally cause diarrhea problems.

## Dilution of Milk Replacer

Another important consideration is the dilution of powdered mare's milk replacer. Mare's milk contains about 10 percent dry matter (or 90 percent water), 2 percent protein, and 1.3 percent fat. Most milk replacers recommend a dilution rate leading to a much more concentrated milk mixture than what a foal would receive from a mare. Therefore, a much higher dilution rate (1:10), which is more similar to natural mare's milk, is recommended. A more diluted milk replacer solution should be fed to provide the recommended total dry matter intake.

## General Care

It is essential to monitor the foal's overall health. If the mare was ill before parturition, the newborn may be malnourished. The foal should be able to stand, walk, have a suckling reflex, and nurse a bottle within two to three hours. Often, small, weak foals may appear fine initially, but begin to deteriorate within 24 hours. If this happens, veterinarian assistance may be critical. Foal neonatal centers are available but can be extremely expensive.

As with any newborn, a dry, clean, warm environment is essential. As the foal becomes stronger, it should be turned out into a small pasture or lot for exercise. If possible, rear the orphan with another orphan, pony, goat, or horse. Orphan foal behavior problems can be reduced if owners make every attempt to treat the foal as a horse and not as a pet.

The health care program of orphan foals must be monitored closely. All routine vaccinations and deworming must be timely for the orphan to get the greatest benefit. Foals should receive their initial vaccinations for tetanus, encephalomyelitis, influenza, and rhinopneumonitis at 60 days of age, with an additional booster four to six weeks later. Parasite control can be initiated at 60 days of age, and should be done at a minimum every eight weeks. A continuous daily dewormer is available and could benefit many orphans by minimizing parasite infestation.

## Expected Growth Rate

Many believe that orphaned foals are "stunted" and never reach their genetic growth potential. However, with sufficient management, these foals can grow at an optimal rate. Recent research has shown orphaned foals, under intensive management and health care, were smaller and had a slower growth rate than foals suckling mares at 30 days of age. However, by 180 days, there was no difference in wither height, and only a slight difference in weight. Thus, with proper management, there should be no long-term effects on mature size of foals orphaned at birth.

**This publication has been peer reviewed.**

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Feeding & Nutrition**

Issued July 2008

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