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Katy Driver

*Raising an orphan foal takes commitment and can be a wonderful experience for the humans involved, but the number one priority should be the long term welfare of a foal that will grow up into an adult that could live for 30+ years. It is as much about providing for its physiological health as for its psychological wellbeing.*

## Nutrition for Orphan Foals

by Gordon Rich,  
Chemical Engineer, BE (Chem) Hons. from Wombaroo Food Products

From time to time breeders are faced with orphaned foals or mares producing limited milk supply. When hand-rearing a foal the aim is to provide nutrition that closely mirrors what would be received from the mother's milk. In many cases it may be possible to foster out an orphan foal to a surrogate mare. If this is not practical then a suitable horse milk replacer should be fed to provide optimum nutrition.

### Colostrum

Success in hand-rearing foals greatly improves if they receive colostrum at birth. Colostrum is the first milk produced by the mare and is high in immunoglobulins (proteins produced in response to infection by micro-organisms). Foals are born devoid of immunity so must acquire their initial immunoglobulins from colostrum in order to fight infections.

Colostrum can only be absorbed for a short time after birth. It is therefore recommended to supply colostrum to young foals within 36 hours from birth, if they have not received sufficient quantities from the mare. Studs often keep frozen mare's colostrum on hand for such emergencies. Otherwise, powdered bovine colostrum can be used to provide a level of passive immunity to foals.

### Composition of Horse Milk

After providing colostrum, the mare starts to produce normal milk to nourish the foal. Horse milk is unique in composition, as can be seen by the comparison with cow's milk in the table below.

Table 1. Milk composition comparison

	Horse	Cow
<b>Solids (grams/litre)</b>	109	127
<b>Energy (kilojoules/litre)</b>	2000	2800
<b>Carbohydrate %</b>	57	38
<b>Protein %</b>	20	26
<b>Fat %</b>	14	30

Horse milk is relatively dilute, with a low solids and energy content compared to cow's milk. This allows for a controlled growth rate of the foal, without putting excess body weight on too quickly. This is important because normally a foal's height increases faster than bodyweight and therefore proper nutrition is essential during this rapid bone growth phase. For example, at one year of age foals reach about 90% of their adult height but only about 60-75% of their final adult weight.

# Raising an Orphan Foal

An excessively rapid weight gain (from too high an energy milk) may be responsible for an increased incidence of skeletal problems in young foals.

Carbohydrate provides the majority of energy in horse milk. The carbohydrate is mainly lactose, which is readily digested by intestinal enzymes in the foal.

Protein supports growth and development of the foal. The protein consists of about 50% whey protein, compared to cow's milk which only has about 20%.

Whey protein has a high biological value for growing foals due to its elevated quantities of essential amino acids (particularly lysine & threonine). Cow's milk or similar products (eg Skim Milk Powder) are therefore not an ideal substitute for foals because they do not contain the whey protein profile of natural mare's milk.

Fat is utilised as an energy source, but the quantity is limited, which helps restrict excessive weight gain. Fatty acids are also used for cell wall structure and brain development. The fat content of horse milk is vastly different to that of ruminants such as cows and goats. For example, horse milk is particularly high in the omega-3 & 6 fatty acids (20% alpha-linolenic acid). The fat from cows or goats milk contain much lower levels of these fatty acids and therefore are not ideal for young foals.

### Feed Volumes

The amount to feed depends on the energy requirement of the foal, and this is calculated based on the metabolic rate of the animal.

It is important to note that energy usage of an animal is not linear with body weight (eg a 100kg foal does not need twice the milk intake of a 50 kg foal). Therefore a simple rule of thumb like "feed 10% of body weight per day" does not apply, as this may be insufficient for young foals but excessive for older ones.

Table 2. Feed Volumes

Foal Weight	Age (approx)	Feed Volume	% of body weight
50 kg	Birth	6 litres/day	12%
100 kg	32 days	10 litres/day	10%
150 kg	72 days	13.5 litres/day	9%

### Hand Rearing

Foals should be housed in a clean, draught-free environment and have access to a grazing paddock and fresh drinking water.

Milk should be warmed to about 30°C and fed every two hours for the first week, reducing this to every 4 hours by the end of the second week. After one month reduce feeding frequency to every six hours. Foals may be initially fed from a bottle and teat, however they quickly learn to drink from a bucket.

During the hand-rearing period body weight should increase by about 1.5kg per day. Typical foal growth charts and feed guidelines can be obtained from manufacturers of milk replacer products. Over-feeding can cause diarrhoea, so large deviations from the suggested feed volumes are not advised.

When the foal is about 2 months old it should begin to show interest in solid food. Introduce a commercial starter feed into the diet and slowly reduce the volume of milk replacer fed. At this time the foal should be exercised in a paddock and have access to both hay and pasture. Carers tend to wean foals quickly, but ideally they should not be weaned before 6 months.

### In a nutshell

- Success in hand rearing foals is greatly enhanced if they receive colostrum at birth
- A quality Horse Milk Replacer should closely resemble mare's milk and be high in lactose, with moderate protein levels, & low fat content.
- Horse milk replacers should have a high whey protein fraction, and the fat should contain elevated levels of omega-3 & 6 fatty acids, in particular alpha-linolenic acid.
- Volumes should be fed according to metabolic energy requirements (based on body weight) for optimum weight gain.

Proper nutrition is essential during this time as skeletal deformities can occur if bone elongation is interfered with by excessive weight gains.

*Continues next page...*



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Foals should be allowed to just be a horse and develop normal socialisation responses

system rather than bottle feeding and water, pasture, roughage, specific dietary feeds such as milk substitute pellets should be provided ad libitum even from an early age<sup>1</sup>.

Coprophagia, i.e. eating faeces, is a normal behaviour of foals<sup>7,8</sup> that mostly occurs during the first few months of life<sup>9</sup> and it is usually the faeces of their dam that they will consume<sup>7,9,10</sup>. It is thought that coprophagia in foals serves to provide nutrients and introduce normal bacterial flora to the gut<sup>9</sup>, therefore it is also recommended that hand-reared foals be supplied with fresh faeces from a healthy adult equine for normal coprophagy<sup>11</sup>.

The orphan foal will need to be handled just the same as any other foal, but with orphans it is vitally important to resist the temptation of letting them be like a large toy. Have frequent (i.e. a few times a day), short (i.e. only a few minutes) training sessions using pressure and release training (i.e. negative reinforcement) to perform various responses that will be useful later in life, just as you would for any other foal. Responses such as coming when called, putting its nose into a headstall, leading anywhere, standing, being handled all over and having feet picked up. Only spend a few minutes at a time on a training session but you can have a few a day<sup>12</sup>. Keep your cues consistent and think in advance what you are going to do and how you are going to do it. Never rush any of it, ever! Be conscious of what the horse is telling you i.e. its body language and actions, being a foal it may not be ready for too much progression too soon. Remember that horses learn very well with negative reinforcement so if they are successful in escaping from whatever it is you want them to do, they will have been reinforced for this and will do it again<sup>13</sup>.

This may all be nice while the foal is still little, but when it is not so little, these responses can become dangerous to the human. As the foal matures, it is also more likely to be the type of horse that could be labelled as 'lacking respect as it walks all over humans' simply because it has not been handled well as a youngster<sup>2,4</sup>.

To avoid these sorts of problems, the foal should be in a large paddock with other foals and allowed to just be a horse so that it has a chance to develop normal horse socialisation responses<sup>2,5</sup>. Separating a foal from other horses could result in it developing a fear of conspecifics<sup>6</sup>. Human interaction should be minimised at meal times, possibly using a bucket feeding

Research has shown that orphan foals can develop to behave the same as non-orphan foals but that they are even more likely to seek social company than non-orphan foals<sup>14</sup>. Orphans usually show less separation anxiety when placed alone in a novel environment compared to non-orphan foals<sup>14</sup>. The maze learning ability of orphan foals has been shown to not differ from that of non-orphan foals although orphans spent significantly more time in the maze in their first exposure to it<sup>15</sup>.

Another study showed that horses that have been extensively handled were slower to learn which way to turn in a maze than minimally handled horses but faster than unhandled horses<sup>16</sup>.

All this research suggests that there is the potential to over-handle foals, something which is very common with orphans. So, if you are faced with having to raise an orphan foal, try and get it fostered with another suitable mare or to live with other foals and train it the same as you would any other foal.



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## Handling the orphan foal

by Dr Amanda Warren-Smith, NCAS(1G), BAppSci(Eq)Hons, PhD

*When raising orphan foals, social development and establishing a sensible relationship with their human carers are as important as great nutrition and physical health. This article reviews relevant scientific findings that should be taken into account when raising orphan foals.*

Orphan foals are best reared by fostering them onto a broodmare that should be as close as possible in size/breed and stage of lactation to the foal's dam so that milk production is appropriate in amount and composition<sup>1,2</sup>.

The intensive human involvement associated with hand-reared foals frequently results in the foals becoming dangerously bonded to the human<sup>3</sup> such that they tend to be 'more like dogs'. They may exhibit behaviours that we might label as 'cute' such as following the human anywhere, suckling on their clothing and initiating play which can include striking, rearing, mounting the human and various versions of chasing games.

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