

Inventing the Wheel:

Hand-Rearing a Single Babirusa (*Babyrousa babyrussa*)

By Nicole Piepers, Nursery Keeper
Los Angeles Zoo and Botanical Gardens, Los Angeles, CA

Introduction

On 20 May 2010, 1.0 babirusa piglet was pulled for hand-rearing due to low body temperature, weakness, small (runt) size and consequent inability to nurse. 1.0 babirusa piglet (littermate) was left with dam, as he was doing fine. There was some discussion of pulling both piglets for hand-rearing, since pigs, in general, tend to do better when hand-reared with a conspecific than not. However, due to our inexperience hand-rearing babirusa, it was decided not to do this. In fact, we discovered that, in general, very few babirusas have been hand-reared successfully to maturity. In our research, we found only one documented case in *The International Zoo News* Vol. 47/1 (No. 298). The paper was titled "The Growth and Development of Two Hand-reared Babirusa at Port Lympne Wild Animal Park" by Robert Saville and Matt Hartley. The paper describes the management of two male babirusa that were born on 13 December 1996. Later that day, they were taken for hand-rearing due to the failure of the dam to rear previous litters and the risk of infanticide. The piglets weighed 600grams (infant A) and 400grams (infant B). They were hand-reared by Robert Saville.

Quoting from article: "Due to the lack of published information on artificial diets for babirusa, a protocol used for hand-rearing domestic swine was adopted (by Port Lympne). Initially, the infants were each fed 2ml of Volostrum (commercial pig colostrum substitute) at two-hourly intervals. On the third occasion this was combined with 7ml of Volac Farmamate milk replacer. This was continued through the night at two-hourly intervals. Human infant bottles and teats were used. After a total of ten feeds (20ml) of colostrum substitute had been administered, only the milk replacer was fed. At five days old, an ad lib. Feeding protocol was adopted, with bottle feeds being reduced to three-hourly intervals. The frequency of feeds was reduced as intake increased."

The paper was not very comprehensive, and did not specify feeding times, amount of feeds per day, when formula increases were made or feeding techniques. The animals were weaned very early, at six weeks of age over four days, much earlier than maternally raised babirusa, which wean at about six months of age. We decided not to follow this protocol due to the limited amount of information it provided. We also did not have any domestic swine formulas in stock nor did we have a source for them. We opted instead to model a protocol loosely based on our experience with warthogs and red-river hogs.

Nursery Data: 1.0 Babirusa (*Babyrousa babyrussa*) "Homer"

Birth Date: 05-20-2010

Date pulled: 05-21-2010

Weight: 423 grams [14.92 oz.]

Body temperature: 96.1°F [35.6°C]

(normal is between 100-101°F) [37.78-38.33°C]

Treatment: umbilicus dipped in Betadyne®

Continued this treatment 2x daily until Day 12

Incubator temperature: 80-85°F [26.7-29.4°C]

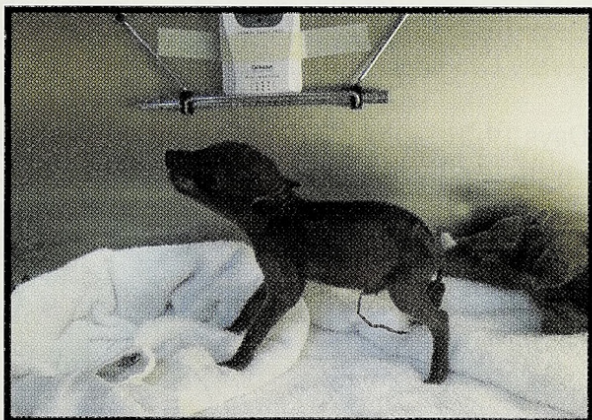
Formula (initial): cow's colostrum

Formula (final): Meyenberg evaporated goat's milk 1:1 water

Nipple type (initial): Pritchard's flutter valve

Nipple type (final): Evenflo® preemie nipple (with hole enlarged)

Initial amt. formula offered: 15ml every two hours for eight feeds (28% body weight)



Day 1 - Homer in incubator

Feeding technique: Did not enjoy being held or handled while feeding. Did best on ground with something to step up on, so angle of bottle was appropriate.

Housing: Housed in a stainless steel incubator until 13 days of age. Piglet was provided with a stuffed animal toy and several towels for security. Incubator temperature was kept between 80-85°F. Temperature was decreased by 10°F at six days of age.

At 13 days of age, piglet was moved to a small stall equipped with hanging heat lamp. Stall was bedded with clean towels over a layer of grass hay over a layer of wood shavings. Towels were used to more easily determine urine and fecal output and to deter ingestion of natural substrate. Moved to a larger stall bedded with wood shavings on Day 47.



Homer on Day 2

Diet Record/Feeding Schedule:

Day 1: 15ml (28% BW) cow's colostrum, 8x daily (every two hours), ribbed nipple.

Days 1-3: As of 4th feeding on Day 1: 15ml cow's colostrum 1:3 evaporated goat's milk 1:1 water, 8x daily (every 2 hours), switched to flutter valve nipple.

Days 4-6: 18ml (28% BW) cow's colostrum 1:3 evaporated goat's milk 1:1 water, 8x daily (every two hours)

Days 7-9: 21ml (23% BW) cow's colostrum 1:3 evaporated goat's milk 1:1 water 8x daily (every two hours). Add 1 pinch Probios™ granules to each bottle.

Days 10-12: 25ml (23% BW) cow's colostrum 1:3 evaporated goat's milk 1:1 water, 8x daily (every two hours). Add 1 pinch Probios™ granules to each bottle.

NOTE: Now offering small amount banana from finger.

Days 13-15: 30ml (24% BW) cow's colostrum 1:3 evaporated goat's milk 1:1 water, 8x daily (every two hours). Add 1 pinch Probios™ granules to each bottle.

NOTE: Now offering small amount porcine grower pellets (soaked).

Days 16-18: 35ml (24% BW) cow's colostrum 1:3 evaporated goat's milk 1:1 water, 8x daily (every two hours). Add 1 pinch Probios™ granules to each bottle.

Days 19-21: 40ml (24% BW) cow's colostrum 1:3 evaporated goat's milk 1:1 water, 8x daily (every two hours). Add 1 pinch Probios™ granules to each bottle.

NOTE: Day 20- Now offering small amount of greens (swiss chard, kale, collard greens).

Day 24- Added raw yam to diet.

Days 22-24: 50ml (23% BW) evaporated goat's milk 1:1 water, 7x daily (every three hours). Add 1 pinch Probios™ granules to each bottle.

Days 25-27: 60 ml (26% BW) evaporated goat's milk 1:1 water, 7x daily (every three hours). Add 1 pinch Probios™ granules to each bottle.

NOTE: Small amount of carrot added to diet.

Days 28-30: 75ml (31% BW) evaporated goat's milk 1:1 water, 7x daily (every three hours). Add 1 pinch Probios™ granules to each bottle.

Days 30-32: 80ml (29% BW) evaporated goat's milk 1:1 water, 7x daily (every three hours). Add 1 pinch Probios™ granules to each bottle.

NOTE: Due to insufficient weight gain, gradually transitioning over four days to a more concentrated formula: evaporated goat's milk 2:1 water. Also now offering free-choice alfalfa.

Day 33: 80ml (27% BW) evaporated goat's milk 2:1 water 1:3 evaporated goat's milk 1:1 water, 7x daily (every three hours). Add 1 pinch Probios™ granules to each bottle.

Day 34: 100ml (29% BW) evaporated goat's milk 2:1 water 1:3 evaporated goat's milk 1:1 water, 6x daily (every three hours). Add 1 pinch Probios™ granules to each bottle.

Day 34: 100ml (29% BW) evaporated goat's milk 2:1 water 1:1 evaporated goat's milk 1:1 water, 6x daily (every three hours). Add 1 pinch Probios™ granules to each bottle. Switched to Evenflo® preemie nipple to slow flow of formula.

Day 35: 100ml (29% BW) evaporated goat's milk 2:1 water 3:1 evaporated goat's milk 1:1 water, 6x daily (every three hours). Add 1 pinch Probios™ granules to each bottle.

Day 36: 100ml (27% BW) evaporated goat's milk 2:1 water, 6x daily (every three hours). Add 1 pinch Probios™ granules to each bottle.

Days 37-46: 120ml (30% BW) evaporated goat's milk 2:1 water, 6x daily (every three hours). Add 1 pinch Probios™ granules to each bottle.

NOTE: Now offering produce in a.m. and p.m

Days 47-59: 140ml (24% BW) evaporated goat's milk 2:1 water, 6x daily (every three hours). Add 1 pinch Probios™ granules to each bottle.

Days 60-65: 140 ml (14%BW) evaporated goat's milk 2:1 water, 5x daily (every three hours). Add 1 pinch Probios™ granules to each bottle.

NOTE: Now offering Mazuri® ADF-25 herbivore pellets in addition to Mazuri® porcine grower.

Days 66-75: 170ml (16% BW) evaporated goat's milk 2:1 water, 5x daily (about every four hours). Add 1 pinch Probios™ granules to each bottle. Also adding ½ tsp. ground porcine pellets to each bottle (not consuming solids)

NOTE: To encourage weight gain, increased formula amt. to what was being offered at six feeds/day. Feeding times also spread out. Also offering some melon in a.m. food tub to encourage consumption of solids.

Days 76-93: Same as above except increased ground porcine pellets to 1tsp. per feeding.

NOTE: Adding ½ hardboiled egg to pellet gruel (mixed) in to encourage consumption. As of Day 83, offering some apple. As of Day 86, offering pear.

Days 94-132: Same as above except increased ground porcine pellets to 2tsp. per feeding.

Days 133-137: Same as above except increased ground porcine pellets to 3tsp. per feeding.

NOTE: Mixing pear flavored baby food in with pellets and grating carrots and yam to encourage consumption of solids.

Days 138-151: Same as above but now offering formula in a crock instead of a bottle. Also increasing porcine pellets mixed into milk over time.

Days 152-158: 220ml (6% BW) evaporated goat's milk 2:1 water 3x daily (every six hours). Add 1 pinch Probios™ granules to each bottle. Also adding 3-4 tsp. ground porcine pellets to each feeding. Offering in a small rubber tub with two handfuls whole porcine pellets. Baby food mixed in for flavor.

NOTE: Feeding produce now in large black tub with scoop of whole porcine grower pellets and handful ADF-25.

Days 159-165: Same as above but now 2x daily (0900 & 1500hrs).

Days 166-193: Same as above but now only 1x daily (0900hrs).

Day 194: Weaned.

NOTE: We were planning on weaning at 180 days old, but held off due to insufficient weight gain and consumption of solids.

Weights

Day 1 = 423g	Day 19 = 1.35Kg	Day 65 = 5.15Kg
Day 2 = 442g	Day 20 = 1.40Kg	Day 72 = 5.80Kg
Day 3 = 475g	Day 21 = 1.40Kg	Day 79 = 6.35Kg
Day 4 = 526g	Day 22 = 1.50Kg	Day 86 = 6.80Kg
Day 5 = 591g	Day 23 = 1.50Kg	Day 93 = 7.15Kg
Day 6 = 672g	Day 24 = 1.55Kg	Day 100 = 7.55Kg
Day 7 = 731g	Day 25 = 1.60Kg	Day 107 = 8.00Kg
Day 8 = 777g	Day 26 = 1.60Kg	Day 114 = 8.50Kg
Day 9 = 811g	Day 27 = 1.65Kg	Day 121 = 9.10Kg
Day 10 = 853g	Day 28 = 1.70Kg	Day 128 = 9.40Kg
Day 11 = 898g	Day 29 = 1.75Kg	Day 135 = 10.15Kg
Day 12 = 939g	Day 30 = 1.85Kg	Day 142 = 10.65Kg
Day 13 = 997g		Day 149 = 11.25Kg
Day 14 = 1.37Kg	WEEKLY	
Day 15 = 1.10Kg	Day 37 = 2.40Kg	~MONTHLY
Day 16 = 1.15Kg	Day 44 = 3.25Kg	Day 179 = 14.3Kg
Day 17 = 1.25Kg	Day 51 = 3.95Kg	Day 215 = 15.4Kg
Day 18 = 1.30Kg	Day 58 = 4.65Kg	(littermate was 16.6Kg)



Homer taking a bottle at three months of age



Homer bothering the tufted deer fawn
at 2 1/2 months old.

with him daily to fulfill his social requirement somewhat, but this did not help him to eat solid food.

At this point, we discussed the possibility of reintroducing "Homer" to his family and continuing to hand-rear him at the exhibit. We thought that this option would possibly ensure better social development and encourage consumption of solid foods.

At two months of age, we brought "Homer" up to the babirusa exhibit to howdy with his mother and brother. Mother and brother were locked into an annex yard, and "Homer" was given run of the exhibit. "Homer" was more rinterested in the keepers in the area. Mother exhibited aggressive behavior if "Homer" came near her fence. Brother was fixated on staying with mom and not at all interested in the newcomer. We continued introductions in the same manner over the next few days, once daily for about 30 minutes at a time. We decided that we would not physically introduce "Homer" to his mother due to the



Homer is introduced to his mother at ~3 months

time with similar results. The next time, we tried this same set-up but without keepers in the yard (keepers were positioned at the patron viewing side of the exhibit). The sibling actively avoided "Homer" (afraid of him). "Homer" was pacing the perimeter fence and searching for keepers. He vocalized for keepers and this seemed to wind up mom. We tried this again the next day with similar results. At this point, we decided to suspend intros due to some safety concerns (potential breach under annex yard fence) and the brother's separation anxiety from mom.

Social Concerns

This animal probably would have thrived more if reared along with a littermate. We tried integrating him with our other infant ungulates - tufted deer [*Elaphodus cephalophus*] and red flanked duikers [*Cephalophus rutilatus*] in the nursery yard. This was deemed unsuccessful after a few sessions, as he got in the habit of chasing and jumping on them, subsequently stressing them out, the tufted deer in particular. From then on, he had to be kept alone in a separate yard. He did however have visual access to the other animals through a chain link fence during this time. He seemed to pick up on eating browse from the deer and duikers. He particularly enjoyed mulberry, natal plum and kaffir plum. Keepers made sure to spend time



Homer eating mulberry leaves at 2 1/2 months old.

aggressive behavior she was exhibiting during the howdy period. After about a week, we physically introduced "Homer" to his brother in the main exhibit yard while mother was locked in annex yard. Keepers stayed in the yard to supervise. "Homer" was again more interested in the keepers. Brother was somewhat panicked that he was separated from mom, and paced the annex yard fence. At one point the two brothers made eye contact, and "Homer" charged at his sibling with open mouth, one ear back and one ear forward. He then turned around, and, full of himself, trotted back to keepers. We did this for three days in a row for about 30 minutes each

When both piglets were four months old, we resumed introductions, not only to dam and brother, but to half sister as well. "Homer's" half-sister was only a few months older and more independent. We thought they might get along. This time, we were leaving "Homer" at the exhibit for the day, with him in the annex yard and the babirusa family in the exhibit yard. The pig keeper would check on them regularly and the nursery keepers would come back to the exhibit for scheduled bottle feedings only. He was transported back to the nursery at the end of the day. We continued this daily. About two weeks later, he was physically introduced to his half sister in the main exhibit yard. Two keepers were present in the yard with them. Shovels, net and baffle board were placed nearby in case the keepers needed to intervene. Several bouts of half-sister chasing "Homer" occurred. One time she pinned him down, and was biting him. Both were very vocal during this. Keeper had to separate them. "Homer" was actively trying to avoid his half-sister, jumping up on log structures or trying to hide between the nursery keeper's legs. This intro lasted about 30 minutes until it was aborted.

Since the introduction with his half-sister did not go very well, we decided against trying it again. Now our plan was to continue as before, bringing "Homer" to the exhibit for the day, to be in the annex yard adjacent to his family. This continued for one month. "Homer" was now five months old. We decided to move him to the exhibit at this time. The howdy set up continued until both "Homer" and his brother were weaned. It had been arranged that both of them would go to San Diego Zoo together, and it was decided that they should be physically introduced there, while in quarantine. We thought that it would work out better if they were properly introduced on neutral territory without the presence of their mother. They both shipped out on 20 January 2011 at eight months of age.

Their introduction went well, and they currently share an exhibit at San Diego Zoo.

In Conclusion

This was our first experience hand-rearing a babirusa. It was a successful first effort, but may require some adjusting if reattempted in the future. Although the mother-reared piglet was not weighed regularly, his body condition was good and "Homer", in comparison, was always smaller and thinner looking. He caught up later though. At seven months of age, they were close weightwise. "Homer" was 15.5Kg and "Jethro" was 16.6Kg. "Homer's" skin was duller in color, dry and less supple compared to "Jethro's". This could have been a genetic defect, or perhaps we were missing a supplement or something else in our rearing plan. At any rate, this protocol is offered to the zoo world as a starting point for hand-rearing babirusa.



Homer enjoys some quality time with the keepers during his hand-rearing in the Nursery at the Los Angeles Zoo.

All photos provided by the author.



Piepers, Nicole. 2011. "Inventing the Wheel: Hand-Rearing a Single Babirusa (Babyrousa babyrussa)." *Animal keepers' forum* 38(8), 307–312.

View This Item Online: <https://www.biodiversitylibrary.org/item/220128>

Permalink: <https://www.biodiversitylibrary.org/partpdf/315626>

Holding Institution

Smithsonian Libraries and Archives

Sponsored by

Biodiversity Heritage Library

Copyright & Reuse

Copyright Status: In Copyright. Digitized with the permission of the rights holder

Rights Holder: American Association of Zoo Keepers

License: <https://creativecommons.org/licenses/by-nc-sa/4.0/>

Rights: <https://www.biodiversitylibrary.org/permissions/>

This document was created from content at the **Biodiversity Heritage Library**, the world's largest open access digital library for biodiversity literature and archives. Visit BHL at <https://www.biodiversitylibrary.org>.