Do elephant seals have twins?
By Bill Goodger

This question came up recently during the 2013 breeding season when a visitor in January thought he saw twins being born and thought he documented the births with pictures. However, when he checked the pictures for time, there was over an hour between the two pup sightings. Some males fighting had distracted him. This led to his own admission that the female may have had enough time to steal a pup from another female and the gulls had taken care of any placenta evidence. This is not the first time either a visitor/docent/scientist has had this experience and to add further difficulty to documenting twin births is the fact that 90% of births occur at night where they can go unobserved.[9] A simple answer to the above question is that it is certainly likely that evolution would select against twinning, because of the likelihood that both twins would not survive.

A place to start answering this question was to consult Harry Momont who is a reproductive specialist at the University of Wisconsin-Madison.

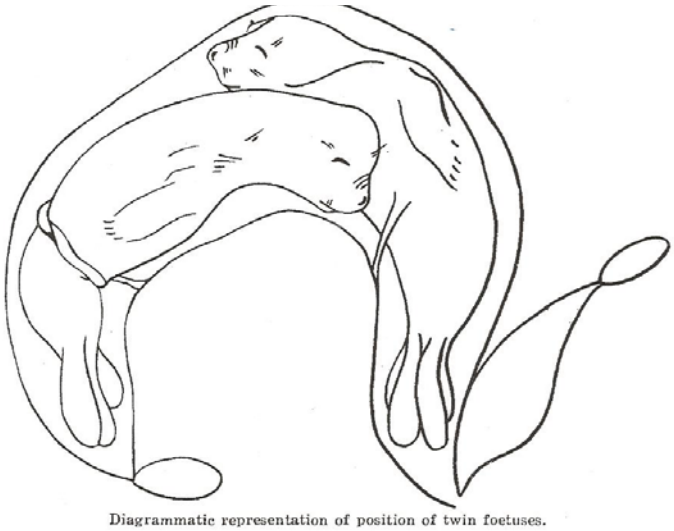
He said "Elephant seals must have a very efficient system for limiting multiple births that makes twinning so rare that it has not been observed. Their gestations may be long and so there may be intense selection against multiple births". Some researchers have wondered if the amount of milk that they have available, remembering they are fasting, could have anything to do with limiting twinning. He said, "I agree with the logic regarding milk production. Producing only enough milk for one would result in the loss of one or both of a set of twins after their birth, but it wouldn't in itself regulate birth number. This doesn't, however, mean you can't have more than one. Dairy cows prefer to give birth to one calf but if you super-ovulate them (using hormones such as gonadotropin), most of the eggs that are released will be fertile. The seal probably regulates ovulation number by a systemic feedback loop that limits the amount of gonadotropin hormone to support follicular growth. Intraovarian inhibition may also occur. Logically, a system as complicated as biology, will make mistakes and result in two ovulations on occasion. This happens quite often in the mare yet few twins are born. This involves a second, intrauterine system that reduces the fetal number back to one by a competitive mechanism. Presumably these later term abortions, if they occur in the seal, would happen at sea.

This information at least provides some basis to do a literature search and see what has been documented. There are eight references with plausible findings but only one reporting on the northern elephant seal (NES), and that an encyclopedia article, not a research paper.

Giving birth usually results in one offspring per year although there have been occurrences of twins.[1] No reference or documentation is given for this claim.

The seven southern elephant seal (SES) citations are described below.

In September 1965, a SES cow was dissected and found carrying twin fetuses. One was dead in utero and both were in the right horn with separate placentas. A twisted umbilical cord probably killed one fetus.[2] (figure 1).



Diagrammatic representation of position of twin foetuses.

89

Figure 1

In 1995 there was gross production of 517 pups with 515 single births and 1 twin birth with a net production at the end of the breeding season of 505 weanlings. They acknowledged that twinning was uncommon in elephant seals.[3]

Stillbirths are rare, but females may abort. Pups are born either headfirst or tail first, with the latter being more common.[4]

Twins are very rare in the elephant seal, as in the northern fur seal.[5] Their occasional birth had been inferred by Laws,[8] and in two cases seen by Gourin at Macquarie Island in 1954, from the sight of two new-born pups near one cow, with no other cow nearby. (This is not conclusive, as sometimes a cow moves some distance away.) One undoubted twin birth took place at Macquarie Island in 1957. When first seen, the cow was having strong contractions, and a pup's hind-flippers could be seen in the unbroken foetal membranes. A newborn pup, with wet fur, was sniffing at the cow's body. Ten minutes later a pup was born whose umbilical cord was broken when the cow turned round, and at the same time a complete placenta, with foetal membranes and a stump of umbilical cord, was expelled. The second placenta followed 12 min later. Examination of the placentae showed the pups to be fraternal twins. Unfortunately the family was not seen again, but it is improbable that both pups could have been reared.[5]

Almost all elephant seal females ashore give birth to a pup,[5] and twins are virtually unknown.[6]

Twins are rare, however in September 1951, a pair of conjoined twins were born in South Georgia. Sealers of the S/F Diaz in New Fortuna Bay collected the monster. It had been still born, and the size was rather more than normal, the nose-tail lengths being 51.5 and 52 inches. The male twins were joined ventrally from the umbilicus forwards; the hind parts were normal and there were eight limbs. When opened, the putrefaction was found to be far advanced, and permitted only a cursory exam, which had to be done in the field. Each of the bodies had separate organization except in the head region, where two crania were

joined anteriorly so that there were no lower jaws and there were two foramina magna. The circulation was separate except in the head region.

The monster's appearance is illustrated below, although in the specimen there was no eye; birds had removed it.[7]

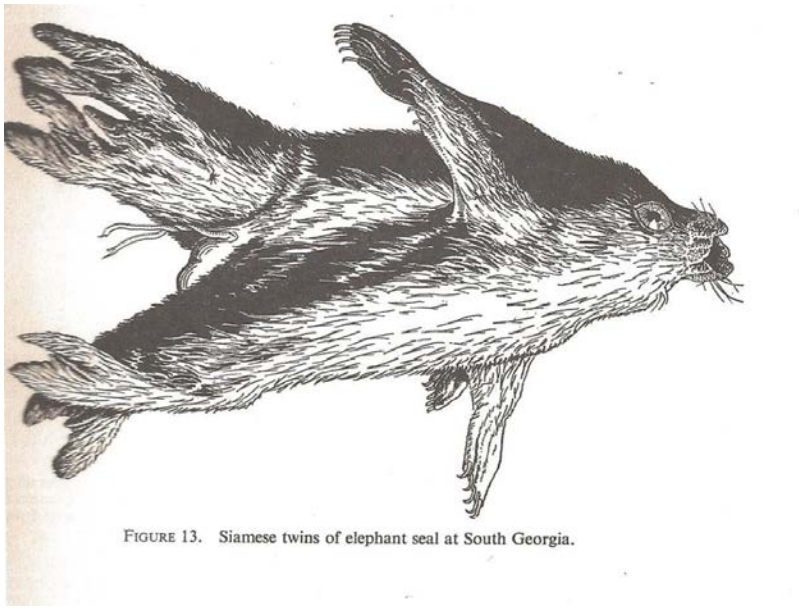


FIGURE 13. Siamese twins of elephant seal at South Georgia.

Figure 2

Laws infers that occasionally twin births can occur. In fact, on October 15th, 1951 in his field notes he observed "I marked a cow which had just pupped. There were 2 pups nearby, a male and a female, with umbilical cords still attached to a fresh placenta. No other cows were near so these were probably twins." [8]

Summary:

It appears that if twins are born to NES they are extremely rare.

Only five referenced and well-documented twins in SES were found. These would be the twin fetuses in 1966 (#2); twin birth in 1999 (#3); twins in 1962 (#5); conjoined twins in 1953 (#7) and the twins observed from field notes in 1956 (#8). Reference #2 illustrates the competitive mechanism in the uterus that occurs in horses to limit twinning. Reference #3 has no documentation beyond the count so we have to believe the authors. Reference #5 is documented with a description. Reference #7 refers to identical twins joined in utero, where perhaps the competitive mechanism did not work. Reference #8 refers to field notes which are present in a book refereed by other researchers.

The above references seem to support the work of Burney Le Boeuf who probably has been involved with more hands on field studies in NES than any other researcher over the years and has not reported a single twin birth.

So how do we answer the question we started with “Do elephant seals have twins”? Twinning has not been documented in NES, and in SES is extremely rare with minimal documentation.

Final thoughts:

An observation from Tim Postiff, is that maybe the reason why there is a difference in twinning prevalence between NES and SES is because of the genetic bottleneck that occurred in the NES in the late 1800’s. This bottleneck did not occur in the SES because they were not hunted with the same intensity. Twinning, which was already a weak trait in NES, may have been further reduced by the near extinction.

It is interesting that four out of the five references were written between 1953-1966 when technology for studying elephant seals had not been developed and scientific investigation was limited. In this period, research was observational based on field notes sometimes supported with post mortem results and when that was not possible seals were killed and then dissected. The scientific investigative approach used currently uses case-control studies where the cases are listed and supported with laboratory work and compared to a similar population (control). The technology advances with time/depth recorders, tagging procedures via Topp.org, GPS, jaw motion recorders and head mounted cameras have allowed us to know that the weaned pups could migrate to Alaska; lantern fish may be a major portion of the NES diet; and the difference between the short and long migration patterns of NES to name a few. These newer investigative approaches along with the technological advances will influence the material we use to educate visitors and allow us to understand more fully the behavior of the NES in the future.

1. Baird, M.L., 2010. Northern elephant Seal. Encyclopedia of Life.

2. Bryden, M.M, 1966. Twin fetuses in the Southern Elephant Seal, Mirounga Leonina

3. Galimberti, F., Boitani, L., 1999. Demography and breeding biology of a small, localized population of southern elephant seals (M.Leonina). Marine Mammal Science, 15(1):159-178.

4. Ling, J.K., and M.M. Bryden. 1992. Mammalian species Mirounga Leonina. No.391, pp.1-8. published by American Society of Mammalogists.

5. Carrick, R., Csordas, S.E., and Ingham, S., 1962. Studies on the southern elephant seal, M.Leonina. IV. Breeding and development. C.S.I.R.O., Wildl.Res.7:161-197.

6. McCann, T.S., 1985. Size, status and demography of southern elephant seal (M.Leonina) populations. Pages 1-17 in Ling,J.K. and M.M.Bryden, eds. Studies of sea mammals in south latitudes. South Australian Museum, Northfield.

7. Laws, R.M., 1953.The Elephant Seal (M.Leonina) I.Growth and Age. FIDS Sci Rep 8:1-67.

8. Laws, R.M, 1956 The elephant seal (Mirounga Leonina Linn) II.General, social, and reproductive behavior. F.I.D.S. Sci.Rep., no.13 88pp

9. LeBoeuf, B.J. et. al. 1972 Perinatal behavior of northern elephant seals and their young. Behavior 43:121-156.