



**SEAL**  
CONSERVATION  
SOCIETY



## **An overview of lactation strategies in different phocid species**



**SEAL**  
CONSERVATION  
SOCIETY



Seal maternal strategy is shaped by duality of marine food supplies and sites where parturition and nursing occurs (terrestrial haul-outs or ice platform).

Maternal body size and phylogeny are considered to be important factors in determining the lactation strategy exhibited by a species.

Major patterns:

➤ Foraging strategy (income breeders)

- Otariids

- AND smaller phocids!

➤ Fasting strategy (capital breeders)

-Phocids



**SEAL**  
CONSERVATION  
SOCIETY



## **Lactating strategy**

### **Foraging cycle**

- Moderate maternal energy stores used to sustain a short perinatal fast
- Feeding trips at sea altering with visits to land (ice) to nurse pups
- A long lactation period (4 month-2 years)
- Milk is relatively low in fat (19-50%)
- Slow rates of mass gain in pups



**SEAL**  
CONSERVATION  
SOCIETY



## **Lactating strategy**

### **Fasting strategy**

- Maternal arrival to breeding site with large energy stores in the form of blubber to support maintenance and lactation costs
- A short lactation period (4-50 days)
- Extremely high-fat milk (40-60%)
- Rapid fattening of pups

### **Plus: intermediate form**

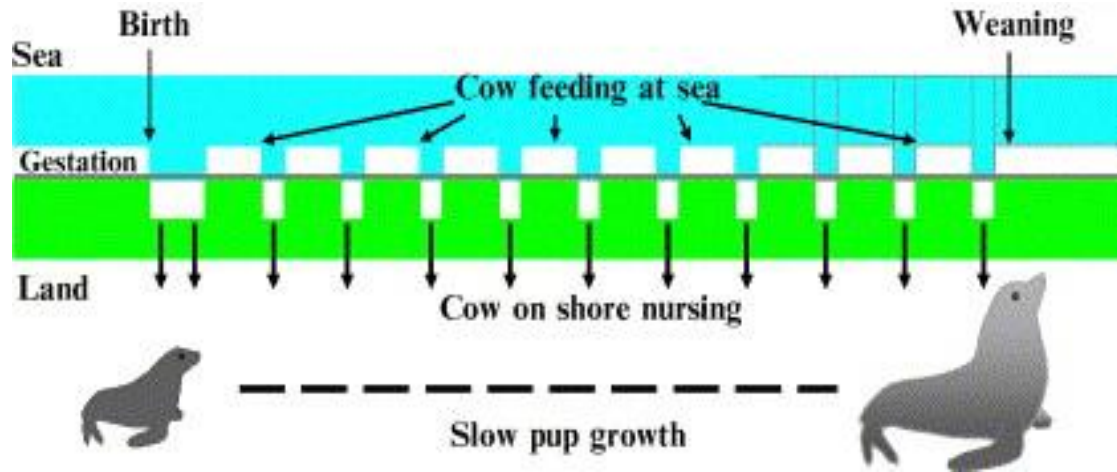
- Relatively short lactation period BUT foraging trips! (in smaller phocids)



**SEAL**  
CONSERVATION  
SOCIETY



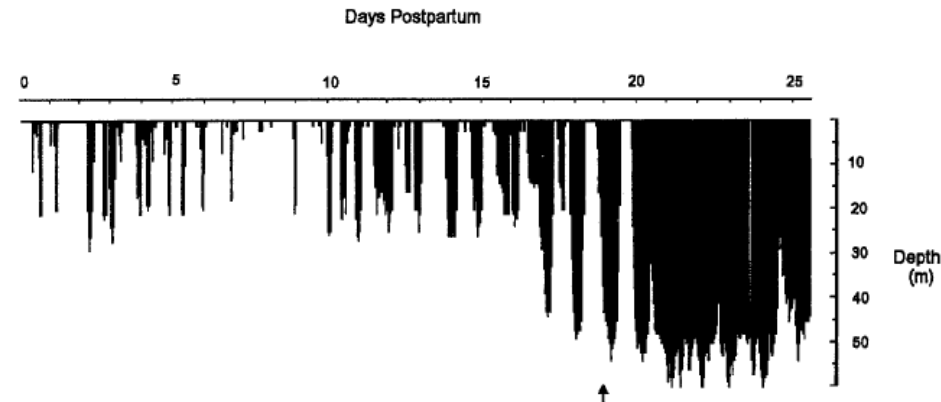
## Foraging strategy



(Schatten et al., 2006)

## Dive depth in females harbour seals

In phocids first shown for  
harbour seals (Boness et al., 1994)





**SEAL**  
CONSERVATION  
SOCIETY



Nursing patterns in different income breeders phocid species

➤ **Ringed seal (*Pusa hispida*)**

- Give birth in undersnow lairs (hummocked shore fast ice or lake ice)
- Yellowish or brownish lanugo coat
- Approx 6 weeks of nursing, 12-22 kg weaning weight (depending on subspecies).
- TDRs placed on ringed seal pups indicated that they spend 50 % of their time hauled out on the ice
- Pups are attended on the ice by their mothers approximately 18% of the time and they are nursed about 3 times per day

*Similar to: Baikal seal (*Phoca sibirica*)*



Photo above: Bjørn Frantzen





**SEAL**  
CONSERVATION  
SOCIETY



Nursing patterns in different income breeders phocid species

➤ **Caspian seal (*Pusa caspica*)**

- Pups are born on stable pack ice (among ice features)
- Yellowish lanugo coat
- 5-6 weeks of nursing
- Pups tend to avoid water until molted (approx 3 weeks old)
- 38-45% of pups were seen without their mother nearby.

*Similar to: harp seal (*Pagophilus groenlandicus*), ribbon seal (*Histiophoca fasciata*), spotted seal (*Phoca largha*)*







**SEAL**  
CONSERVATION  
SOCIETY



Nursing patterns in different income breeders phocid species

➤ **Bearded seal (*Erignathus barbatus*)**

- Pups are born on floe ice semi- or fully molted, actively enter water
- Approx 3-4 weeks of nursing
- Pups spend 53% of their time in the water
- Pups are attended on the ice by their mothers approximately 16% of the time



© Steven Kazlowski / SeaPics.com

➤ **Grey seal (*Halichoerus grypus*)**

- Land breeding and ice breeding subspecies
- White coat pups are thought to enter water
- 2 weeks of intense nursing, 75% of time pups are attended by mothers







**SEAL**  
CONSERVATION  
SOCIETY



Nursing patterns in different income breeders phocid species

➤ **Harbour seals (*Phoca vitulina*)**

- Land breeding and ice breeding subspecies
- Approx 3-4 weeks of nursing, 20-25kg weaning weight
- Pups are well-developed at birth. Their eyes are open, lanugo coat is molted and they can swim and follow their mothers.
- Pups spend from 49 to 60% of the time hauling out.





**SEAL**  
CONSERVATION  
SOCIETY



**Thanks for your attention!**



**SEAL**  
CONSERVATION  
SOCIETY



## References

Andrievskaya, E.M. and Trukhanova I.S., (2010) «Review of basic biological parameters important for successful rehabilitation of the pups of different ringed seal (*Pusa hispida*) sub-species», - Marine Mammals of the Holarctic: collection of the scientific papers after the sixth international conference (Kaliningrad, Russia, October 11-15, 2010), – Kaliningrad: Kapros. – 654 pp.

Bekkby, T., and Bjørge, A. 2000. Diving behaviour of harbour seal *Phoca vitulina* pups from nursing to independent feeding. *Journal of Sea Research*, 44: 267–275.

Boness D. J., Bowen W. D. and Oftedal O. T., 1994. Evidence of a maternal foraging cycle resembling that of otariid seals in a small phocid, the harbor seal *Behavioral ecology and sociobiology*, Volume 34, Number 2, 95-104, DOI: 10.1007/BF00164180

Brennan A.J., Sharp J.A., Lefevre C., Topcic D., Auguste A., Digby M., Nicholas K.R., 2007. The Tammar Wallaby and Fur Seal: Models to Examine Local Control of Lactation *Journal of Dairy Science* Volume 90, Pages E66–E75



**SEAL**  
CONSERVATION  
SOCIETY



## References

Encyclopedia of Marine Mammals (Second Edition) 2009. Edited by: William F. Perrin, Bernd Würsig and J.G.M. Thewissen. Elsevier Inc. 1316 pp

Lydersen C., Kovacs K.M., 1999, Behaviour and energetics of ice-breeding, North Atlantic phocid seals during the lactation period. Marine Ecology Progress Series Volume: 187, Publisher: Inter-Research, Pages: 265-281

Schatten G. P., ser. ed., Sharp J. A., Cane, K. N. Lefevre C., Arnold J. P. Y., and Nicholas K. R., 2006. Fur Seal Adaptations to Lactation: Insights into Mammary Gland Function, Current Topics in Developmental Biology, 72, pages 276–308, Academic Press, New York.

Wilson S., Dolgova E., Trukhanova I., Goodman S., 2012. Breeding behaviour and pup development in the Caspian seal, *Pusa caspica*, Proceedings of the International Conference “Marine Mammals of Holarctic” ... in press.