

V. Smagol^{1, *}, A. Dzhulai²

¹ I. I. Schmalhausen Institute of Zoology, National Academy of Sciences of Ukraine,
15 Bohdana Khmelnytskogo Str., Kyiv, 01030, Ukraine

² State Institution National Antarctic Scientific Center, Ministry of Education and Science of Ukraine,
16 Tarasa Shevchenka Blvd., Kyiv, 01601, Ukraine

* Corresponding author: v.smagol@gmail.com

CHANGES IN WEDDELL SEAL *LEPTONYCHOTES WEDDELLII* (PHOCIDAE) BEHAVIOUR AT THE FIRST STAGE OF ONTOGENESIS

ABSTRACT. Objective. The analysis of changing the Weddell seal diurnal activity during first two weeks post partum. **Methods.** The «budget of time» method was used with measuring of time of different behavioral patterns (feeding, learning and motion activity, sleep). It was started since second day and measured every 5 days. **Results.** The correlation of time for different behavioral activity for 2, 7 and 12 days of puppi'es life changing because of feeding time decreasing (since 30 % till 24 % and till 14 %) and in parallel – learning and motion activities in rising (since 42 % till 41 % and till 40 %). The time for sleeping changed insignificantly. At first days after birth certain behavioral patterns were characterized by short-term, frequent change of sequence and randomness. Later the phases of behavioral patterns became longer, more continuous and consecutive. So, beginning and the end of sleeping is correlated with the most longer feeding interval. Starting with 17 day age, the imbalance of behavioral patterns of the pup has been observed. This imbalance was caused by a long-term being in the sea and fragmentariness contact with the female. The duration of feeding behaviour, which caused by lactation, is declining to 5 %, and learning and motion activity (include being under water) increasing to 82 % (duration of sleeping embraces 13 % of total time budget) . So probably is correlation between mastering of water space and getting of meal. It compensates declining of volume of milk consumption. **Conclusions.** The study of the budget of time of the Weddell seal puppy has reliable results only until that period of time when the puppy started to go into the water (11–15 day age). Visualization of observing is limited by concrete location (the place of puppi'es birth). It doesn't eliminate probability of display any behavioral patterns under water and any other place on surface of ice.

Keywords: time budget, Weddell seal, behavioral patterns, female, pup.

INTRODUCTION

The Weddell seal is a one of the most typical specimen of Antarctic water with a circumpolar distribution surrounding Antarctica. Comparing to the other species of seals the Weddell seal does not migrate to the long distance and it lives in offshore water on shore-fast ice (in winter) and sloping shore of Antarctica and surrounding islands (in summer). In area of Ukrainian Antarctic Akademik Vernadsky station the Weddell seal is found during the whole year. The Weddell seal puppies are born in September-October. During the long period of time the Argentine Islands Archi-

pelago became the birthplace for Weddell seal puppies. The study of the Weddell seal during Ukrainian Antarctic expeditions has been started in 2006. The tropic preferences (Dyky, 2009; Dyky, Salgansky, 2014), the specificity of Weddell seals migrations (Dyky, Drogonovska, 2015, Stirling, 1969), rather than growth of the newborn pups were investigated (Dyky, Salgansky, 2013). However, Weddell seals pups «budget of time» stays without proper attention.

MATERIALS AND METHODS

For analysis of daily activity Weddell seal pups the time budget method was applied (Ognetov, 2009; Zhavorova et al., 2011; Savonin, Philipiechev, 2015; Sve-

tocheva et al., 2017). The length of observation was 12 hours (from 7 a.m. till 7 p.m.) during daytime. The weather conditions during the observation were relatively stable – low temperature (average daily tem-

perature varied from $-0.8\text{ }^{\circ}\text{C}$ to $-9.2\text{ }^{\circ}\text{C}$), weak wind (from 1.1 to 10.9 knots) and rare precipitation which covered less than half of all time and reached 2.3 mm only one day. The observation of the stud- ied pup

Table 1. The time budget of behavioral patterns of a pup (2nd day post partum)

Learning and motion activities		Feeding		Sleeping	
Period of time, hrs	Length	Period of time, hrs	Length	Period of time, hrs	Length
7:00–7:23 a.m.	23 min	7:23–8:09 a.m.	46 min	9:12–10:25 a.m.	1 hr 13min
8:09–8:45 a.m.	36 min	8:45–9:12 a.m.	27 min		
		10:25–10:49 a.m.	24 min		
10:49–10:57 a.m.	8 min	10:57–11:16 a.m.	19 min	11:47–12:55 a.m.	1 hr 8 min
11:16–11:47 a.m.	31 min				
		12:55 a.m.–1:11 p.m.	16 min		
1:11–1:27 p.m.	16 min	1:27–2:08 p.m.	41 min	2:08–2:34 p.m.	26 min
		2:34–2:40 p.m.	6 min	2:40–3:31 p.m.	51 min
3:55–4:46 p.m.	51 min	3:31–3:55 p.m.	24 min		
4:57–5:36 p.m.	39 min	4:46–4:57 p.m.	11 min	5:36–7:00 p.m.	1 hr 24 min

Table 2. The time budget of behavioral patterns of a pup (7th day post partum)

Learning and motion activities		Feeding		Sleeping	
Period of time, hrs	Length	Period of time, hrs	Length	Period of time, hrs	Length
		7:00–7:04 a.m.	4 min	7:48–9:40 a.m.	1 hr 52 min
7:04–7:28 a.m.	24 min.	7:28–7:33 a.m.	5 min		
7:33–7:48 a.m.	15 min				
9:40–9:45 a.m.	5 min	9:45–10:06 a.m.	21 min	11:45 a.m.–2:09 p.m.	2 hrs 24 min
10:06–10:19 a.m.	13 min	10:19–10:25 a.m.	6 min		
10:25–10:45 a.m.	20 min	10:45–11:35 a.m.	50 min		
11:35–11:45 a.m.	10 min				
2:09–2:20 p.m.	11 min	2:20–2:44 p.m.	24 min		
2:44–3:15 p.m.	31 min	3:15–3:38 p.m.	23 min		
3:38–5:02 p.m.	1 hr 24 min			5:02–5:11 p.m.	9 min
5:11–5:18 p.m.	7 min	5:18–5:31 p.m.	13 min		
5:31–5:39 p.m.	8 min	5:39–5:51 p.m.	12 min		
5:51–6:14 p.m.	23 min	6:14–6:24 p.m.	10 min		
6:24–6:29 p.m.	5 min			6:29–6:57 p.m.	28 min
		6:57–7:00 p.m.	3 min		

behavior was carried every 5 days since the second day of its life. The stopwatch was used for measure period of time of the behavioral patterns. The activity of the seal was divided into three groups for convenience:

- the sleep;
- feeding behavior (suckling, udder massage, brief rest between suckling (less than 3 min), change of teats;
- the learning and motion activities (comfortable communication with female, muzzle touching, lightly bite of female, motion around female (about one and a half meters), crawling away, looking around, vocal

communication, doing the physiological deeds, short attempts to suckling (less than 3 min) which has no trophic needs).

RESULTS

The motion activity of the female after parturation was minimal. The female was mostly sleeping or stayed in a drowse thereby the energy conservation took place. The cows did not feed at all for a long time in spite of constant feeding of pups. Observation of the Weddell seal pups behavior on the second day of its life shows short-term and frequent change of behavioral mechanisms (Table 1).

Table 3. The time budget of behavioral patterns of a pup (12th day post partum)

Learning and motion activities (staying at sea included)		Feeding		Sleeping	
Period of time, hrs	Length	Period of time, hrs	Length	Period of time, hrs	Length
7:00—10:00 a.m. (7:50—9:55 a.m.)	3 hrs (2 hrs 5 min)	10:00—10:27 a.m.	27 min		
10:27—11:17 a.m.	50 min	11:17—11:37 a.m.	20 min		
11:37—11:47 a.m.	10 min			11:47—12:50 a.m.	1 hr 3 min
12:50 a.m.—1:06 p.m.	16 min			1:06—3:05 p.m.	1 hr 59 min
		3:05—3:25 p.m.	20 min		
3:25—4:05 p.m.	40 min			4:05—5:32 p.m.	1 hr 27 min
		5:32—6:01 p.m.	29 min		
6:01—6:11 p.m.	10 min	6:11—6:17 p.m.	6 min		
6:17—6:45 p.m.	28 min			6:45—7:00 p.m.	15 min

Table 4. The time budget of behavioral patterns of a pup (17th day post partum)

Learning and motion activities (staying outside the observation area included)		Feeding		Sleeping	
Period of time, hrs	Length	Period of time, hrs	Length	Period of time, hrs	Length
7:00 a.m.—2:12 p.m. (7:51—9:28 a.m.; 10:31— 10:46 a.m.; 1:00—1:20 p.m.)	7 hrs 19 min (2 hrs 12 min)	2:12—2:27 p.m.	15 min		
2:27—4:25 p.m. (2:43—4:03 p.m.)	1 hr 58 min (1 hr 20 min)	4:25—4:42 p.m.	17 min		
4:42—4:54 p.m.	12 min	4:54—5:00 p.m.	6 min		
5:00—5:25 p.m.	25 min			5:25—7:00 p.m.	1 hr 35 min

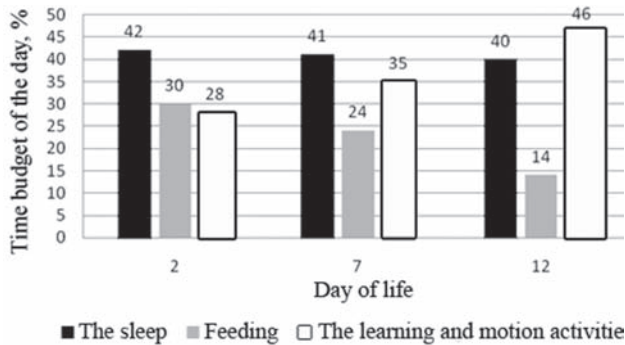


Figure. Proportions between time budget of behavioral patterns of the pup and the day of its life

The cycles of the learning and motion activities and the sleep at the evening and the morning time lasts a little longer. In the middle of the day, these cycles become shorter. However, this tendency has not spread to the feeding behavior, which duration could be various at different period of the day. The time budget for this period of observation was: the sleep took 42 %, feeding took 30 %, the learning and motion activities took 28 %. The observation that was done on the seventh day of the pup's life (Table 2) showed that the sleep occurred during the first half of the day mainly. The lactation was interrupted often by learning and motion activities. In all cases the feeding was stopped by the female that was probably caused by lack of milk. When the pup woke up the communication between it and the female took place by specific vocal signaling. The time budget for this period of observation was as the sleep took 41 %, feeding took 24 %, learning and motion activities took 35 %.

Therefore, the feeding time decreased and the time for learning and motion activities increased. The length of the sleep stayed at the same level, but its specificity had changed. The feeding was synchronized with sleeping. The pup ate more intensively immediately after its awakening and immediately before its falling asleep. Between learning and motion activities the periods of time for feeding were shorter.

At the 12 day of its life (Table 3) the pup started to go into the sea.

Learning and motion activities included staying in the sea (17 % of the time budget). The investigation

of aqueous medium by a pup was synchronized with its mother – female went in the sea first and the pup went to the sea after her. However, the pup could come back from the sea independently from its mother. Unlike female, the pup is attached to the place of birth at this stage of life. The pup appears from the nearest ice-hole every 2–4 min for breathing. Also the pup started to take care of its fur after its coming out of the water. It was a new behavioral pattern in addition to staying under the ice-field. The time budget for this period of observation was as the sleeping took 40 %, learning and motion activities (staying at sea included) took 46 %, feeding took 14 %.

It is a fact, that the length of the sleep had changed least of all (42–41–40 %) relative to the previous periods of observation. The correlation of learning activity and feeding (lactation) had the biggest disproportion. So the staying in the sea could be connected with feeding, which could compensate for decrease of lactation.

Observation of the motion activity that was done on the 17 day of pup's life (Table 4) showed that the pup stayed without female for a long time, went to the sea independently, moved on a big distance (about several tens of meters on the substratum and several hundreds of meters under the water), communicated with another females and pups. The time budget for this period of observation was as the sleeping took 13 %, the learning and motion activities took 82 %, feeding (lactation) took 5 %.

In time the length of learning and motion activities increased considerably while the sleeping and lactation periods were decreased. Calculation of the time budget of the sleep and feeding was based on the observation of certain birthplace. However, the pup was outside the birthplace 29 % of the time budget (including being in the sea) which did not except probability of sleeping and being with mother (lactation include) in another place on the ice. Therefore, at next weeks studying had no reliability because of essential movement of pup and its staying outside the observation area. It should be noted that Weddell' seals (pup and female) stayed near the birthplace during nighttime and they returned there before twilight.

CONCLUSIONS

The study of time budget of the Weddell seal pup is reliable only before the pup started to leave birthplace for a long time (11–15 day post partum). The proportion of time for different behavioral activity during first two weeks of Weddell seal life are changing. The feeding time is decreasing (from 30 to 14 %) and increasing of learning and motion activities (from 28 to 46 %). The time for sleeping is changing not insignificantly (from 42 to 40 %) (Figure). At first days after birth certain behavioral patterns were characterized by a short-term, frequent changes and randomness. Later the phases of behavior patterns became longer, more continuous and consecutive in most cases. In particular, the start and the end of the sleep correlate with the longest interval of the feeding. Starting with two-week age, the imbalance of behavioral patterns of the pup has been observed. This imbalance was caused by a long-term being in the sea and fragmentariness contact with the female.

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В. Смаголь^{1, *}, А. Джулай²

¹ Інститут зоології імені І.І. Шмальгаузена Національної академії наук України, м. Київ

² Державна установа Національний антарктичний науковий центр МОН України, м. Київ

* Corresponding author: vsmagol@gmail.com

ЗМІНИ ПОВЕДІНКИ ТЮЛЕНЯ УЕДДЕЛА
LEPTONYCHOTES WEDDELLII (PHOCIDAE)
НА ПОЧАТКОВОМУ ЕТАПІ ОНТОГЕНЕЗУ

РЕФЕРАТ. Мета. Аналіз зміни добової активності тюленя Уеддела впродовж перших двох тижнів життя. **Методи.** Використано методику «бюджету часу», з фіксацією тривалості окремих зразків поведінки (годівля, пізнавально-рухова активність, сон) кожної 5-ї доби, починаючи з 2-ї доби життя. **Результати.** Співвідношення часу, затраченого на різну

поведінкову активність впродовж 2-ї, 7-ї та 12-ї доби життя змінюються за рахунок зменшення тривалості годівлі (з 30 до 24 та до 14 %) і паралельно – збільшення пізнавально-рухової активності (з 28 до 35 та до 46 %). Тривалість сну змінюється неістотно (з 42 до 41 та до 40 %). В перші дні життя окремі поведінкові паттерни характеризуються короткотривалістю, частою зміною черговості та хаотичністю. Надалі усі фази поведінки стають довшими, у більшості випадків – безперервними та послідовними. Зокрема, початок та закінчення сну співвідноситься з найбільш тривалими проміжками годівлі. На 17-у добу життя у щеняти знову спостерігається дисбаланс поведінкових паттернів, зумовлений тривалим перебуванням під водою та фрагментарними контактами з самицею. Між тим, тривалість кормової поведінки, пов'язаної з лактацією скорочується до 5 %, а пізнавально-рухової активності (у т. ч. перебування під водою) – збільшується до 82 % (тривалість сну охоплює 13 % загального бюджету часу). Таким чином, освоєння водного простору, ймовірно, пов'язано зі здобуванням їжі, що компенсує зменшення обсягів споживання молока. **Висновки.** Дослідження «бюджету часу» щеняти тюленя Уеддела доводять їх достовірність лише до початку контакту з водним середовищем (11–15 день від народження). Візуалізація спостережень обмежується конкретним локалітетом (місцем народження тюленяти), що не виключає імовірності прояву бодай-яких поведінкових паттернів, як під водою, так і в іншому місці над поверхнею криги.

Ключові слова: бюджет часу, тюлень Уеддела, поведінкові паттерни, самиця, щеня.