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**DEVELOPMENT OF WEIGHT AND LENGTH OF EURASIAN OTTER
(*Lutra Lutra*) CUBS**

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Abstract: In order to estimate age of otter cubs found dead, injured or orphaned, size parameters are needed. Measurements of weight and length over a period of 107 days are given for 32 cubs born since 1979 in the enclosures of Aktion Fischotterschutz. It is hoped that publication of these data will assist age determination of *L. lutra* cubs up to the age of 3.5 and encourage other institutions breeding otters to take similar measurements to increase the database for statistical analysis.

INTRODUCTION

Eurasian otters (*Lutra lutra* L.) in captivity have non-seasonal breeding behaviour (REUTHER, 1991). This seem to be true also for wild otters in most parts of the species' range in Europe (REUTHER, 1993).

Parameters are needed for age determination if otter cubs are found dead, injured or orphaned. HEGGBERGET (1996) published criteria for assigning approximate age in months of cubs up to 6 months of age based on opening of eyes and dental development.

Measurements of weight and length over a period of 107 days are available for 32 cubs born since 1979 in the enclosures of Aktion Fischotterschutz. It is hoped that publication of these data will assist age determination of *L. lutra* cubs up to the age of 3.5 and encourage other institutions breeding otters to take similar measurements to increase the database for statistical analysis.

MATERIALS AND METHODS

Aktion Fischotterschutz has kept otters in captivity since 1979 (Otter Research Enclosure Oderhaus 1979 - 1988, Otter-Zentrum Hankensbüttel since 1988). In the period 1980 - 1998 14 litters were born, totalling 31 cubs (Table 1). Measurements of weight and length could be taken from 30 cubs.

Table 1: Litters of *Lutra lutra* bred in the enclosures of Aktion Fischotterschutz

Litter	Date of birth	Father	Mother	Size and sex ratio	Survived
01	26/09/80	Adam	Eva	1.0	0.0
02	14/05/85	Adam	Otti	0.1	0.0
03	27/11/85	Adam	Springe	0.1	0.0
04	14/07/86	Adam	Lady	3.1	1.0
05	26/06/87	Adam	Lady	3.0	3.0
06	21/08/88	Adam	Lady	0.3	0.3
07	11/07/89	Tarka	Ulla	3.0	3.0
08	19/04/90	Lord	Lady	1.0	1.0
09	28/08/91	Dotz	Clyde	0.1	0.1
10	22/09/92	Lord	Ulla	1.1	1.1
11	08/11/92	Lord	Clyde	2.1	2.1
12	20/09/96	Lord	Cleo	1.2	0.0
13	02/05/97	Lord	Clyde	1.1	1.1
14	27/02/98	Gerry	Cleo	1.2	1.2

Example: 1.1.2 = one male, one female, two cubs of unknown sex

Unfortunately it was not possible to take all measurements (weight, body length, total length) from all cubs at all times (Figures 1, 2 and 3). Minimising disturbance to females and cubs was a guiding principle and, therefore, data recording was limited by the behaviour of the animals. Female behaviour varied individually, and from litter to litter. The facilities of Aktion Fischotterschutz do have the advantage that all litters were born in breeding-boxes where the animals can be observed by video-cameras or by microphones.

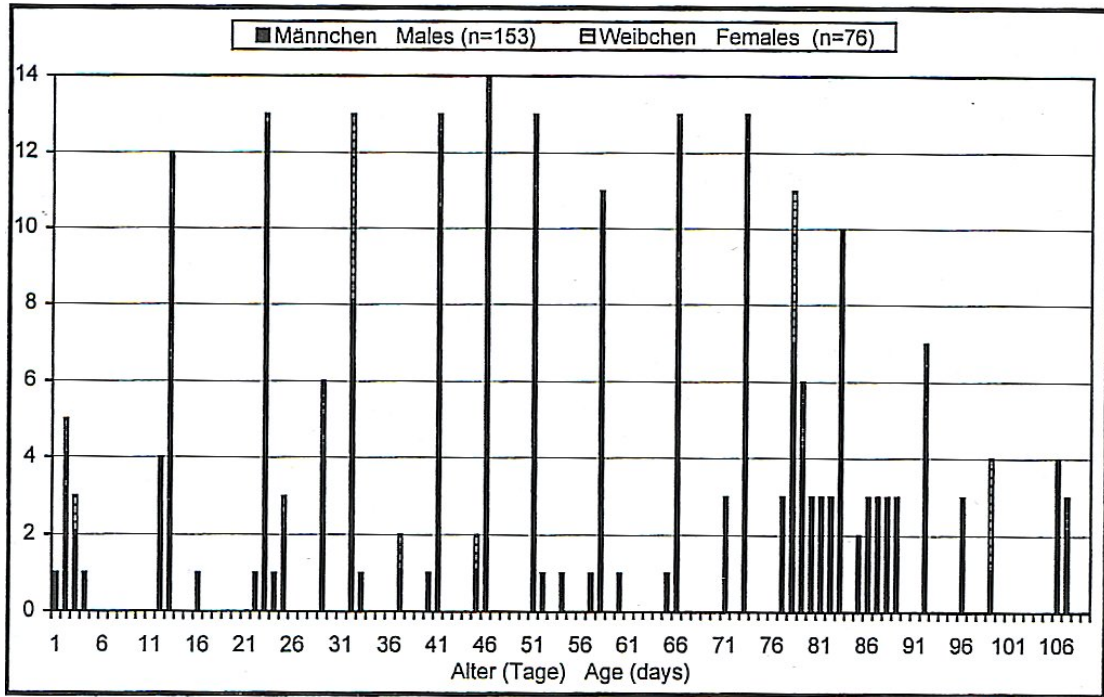


Figure 1. Number and range of measurements of weight (n=229)

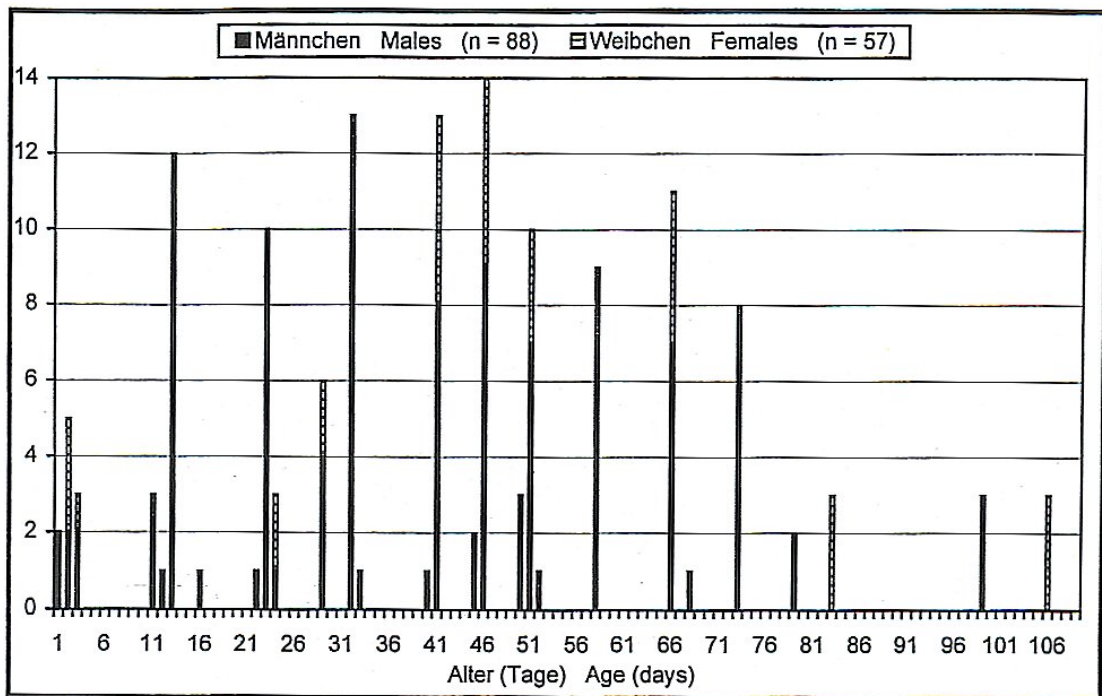


Figure 2. Number and range of measurements of total length (n=145)

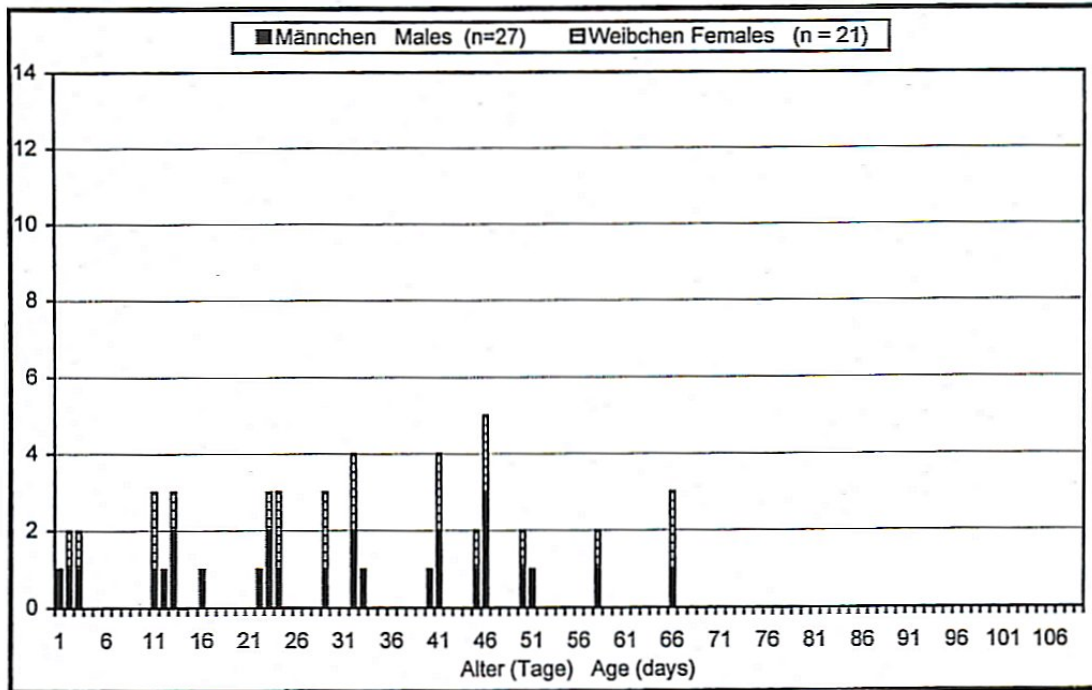


Figure 3 . Number and range of measurements of body length (n=48)

Measurements were usually taken when the female left the breeding box for her evening feed. The sliding door of the box was closed as noiselessly as possible, allowing the cubs to be handled for some time, unnoticed by the mother. The time taken for the mother to try to return to the cubs and find the door shut varied from female to female, but, in general, increased with the age of the cubs. With advancing age the cubs' reactions became the factor limiting the time available for taking measurements. In their second month the chance of them screaming or whistling increased and once they reached 80 days most of them started biting.

Increasing activity and aggression of the cubs caused problems, especially in measuring length. In many cases it was not possible to hold the animals straight - even if two people worked together. Therefore fewer, less reliable, lengths than weights were recorded. In most cases the total length from nose to tip of tail was measured. In some cases body length from nose to base of tail only, or additionally, was measured. This was done using a tape graduated in centimetres and millimetres, placed dorsally on the animal's body. Readings were taken to the nearest half centimetre.

Two types of balances were used to weight the cubs. Up to a weight of 1000 grams in most cases it was possible to use a digital balance showing the weight in grams. Once the cubs were older than 40 days and exceeded this weight they were weighed in a bag hung on a spring balance graduated in units of 10 grams; weight being given to the nearest 10 grams.

RESULTS

Weight

Figure 4 shows the mean values for the weight of 30 cubs, based on 229 measurements (153 male, 76 female) over the first 107 days of life. These data indicate a doubling of weight in each of the first two ten days periods and thereafter an average increase of 300 grams per ten days. It is obvious from the graph that the spread of the mean values is increasing by the age of approximately two months.

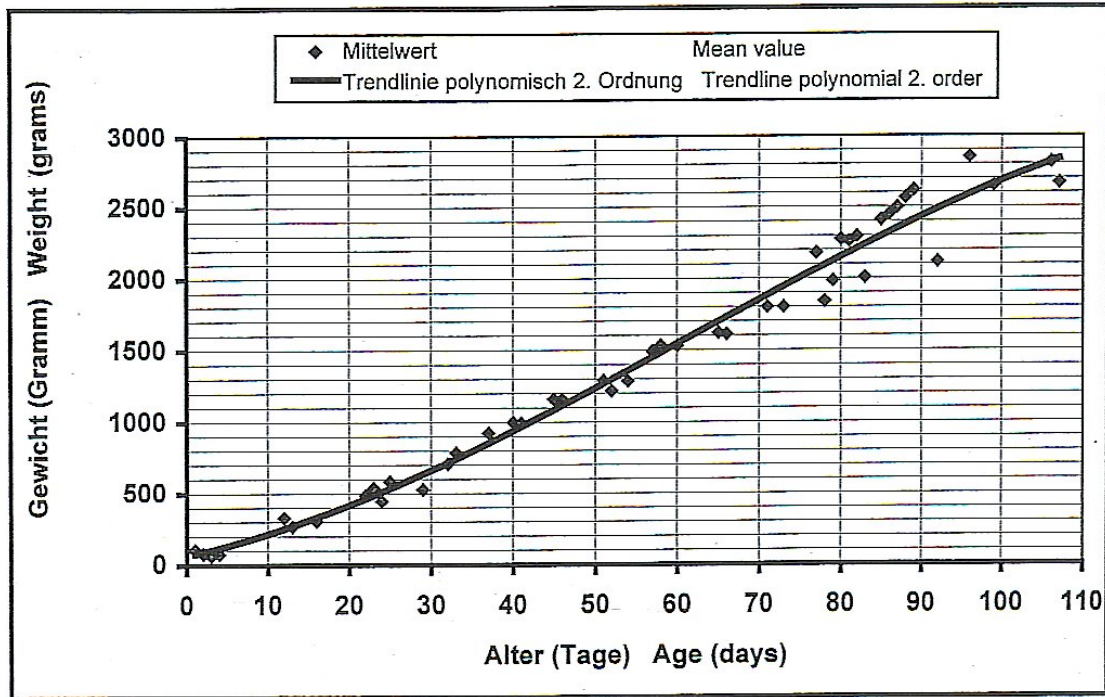


Figure 4 . Mean values for increase in weight of all cubs measured (n=30)

These data are closely related to the experiences of GREEN (pers. comm.) who raised two cubs from the wild, which doubled their weight from 200 to 400 grams in ten days and from 400 to 800 grams in twelve days. In the next ten days they added 275 grams and the next 300 grams took seven days. A weight of 3.000 grams was reached in 99 days.

As is shown in Figure 5 the increase in weight is very similar for the 17 males and 13 females measured. The trend-line seems to indicate a slightly greater weight rise in males around the 40th and the 105th day of life.

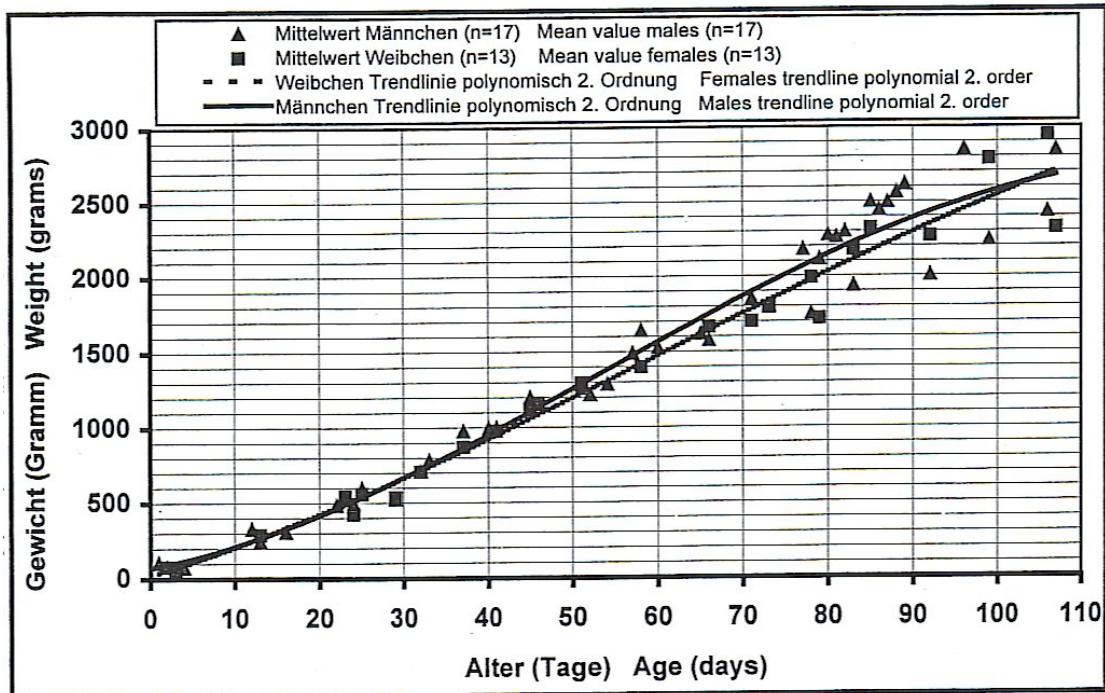


Figure 5. Mean values for sex specific increase in weight

Total length

145 measurements of total length (88 for male, 57 for female) were taken from 26 cubs over their first 107 days of life. Figure 6 shows that the curve of length increase is different from that of weight. During the first month the average increase in total length is approximately 7 cm per 10 day period, in the second month it is 6 cm per 10 days, in the third month it is reduced to 4 cm per 10 days and an increase of 2 cm per 10 days is indicated for the fourth month.

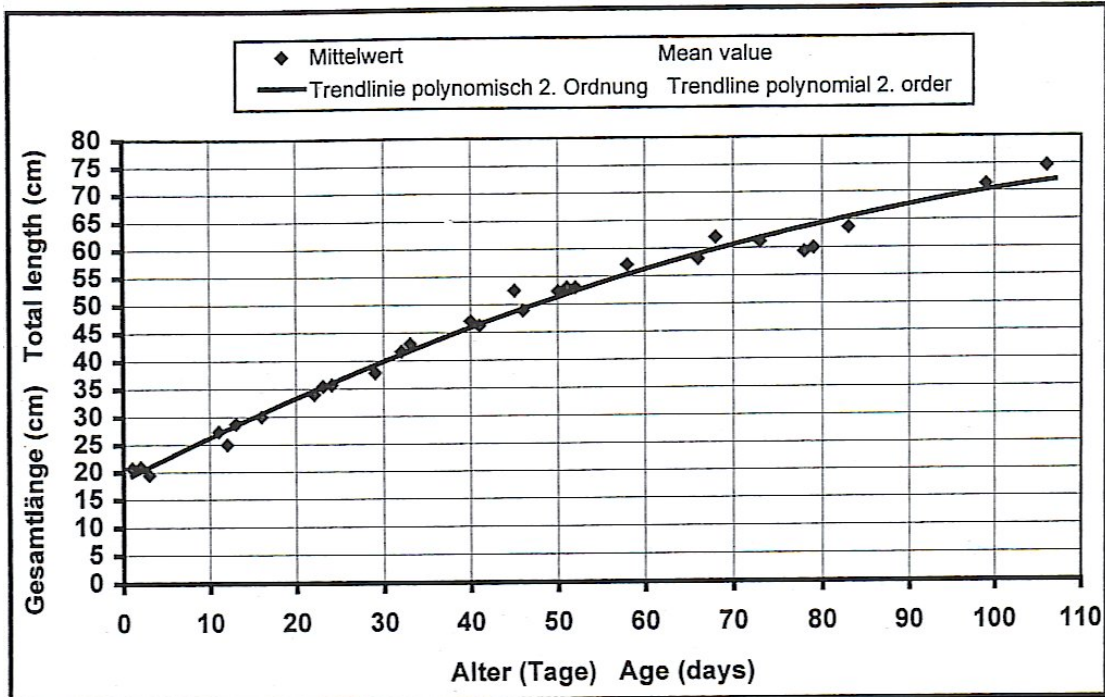


Figure 6. Mean values for increase in total length of all cubs measured (n=26)

There seems to be no significant difference between the increase of total length in the 15 males and 11 females on which Figure 7 is based.

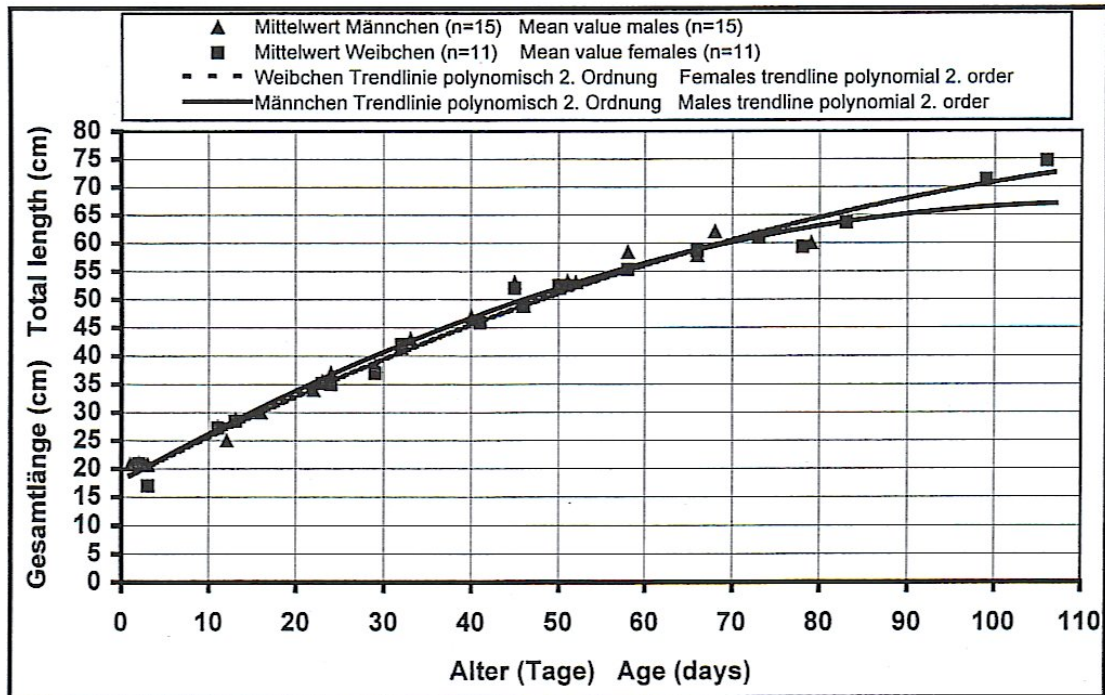


Figure 7. Mean values for sex specific increase in total length

Body length

Only 48 measurements (27 male, 21 female) of body length are available from 14 cubs from the first 66 days of life (Figure 8). This curve shows a more constant 3-5 cm increase in length per 10 days.

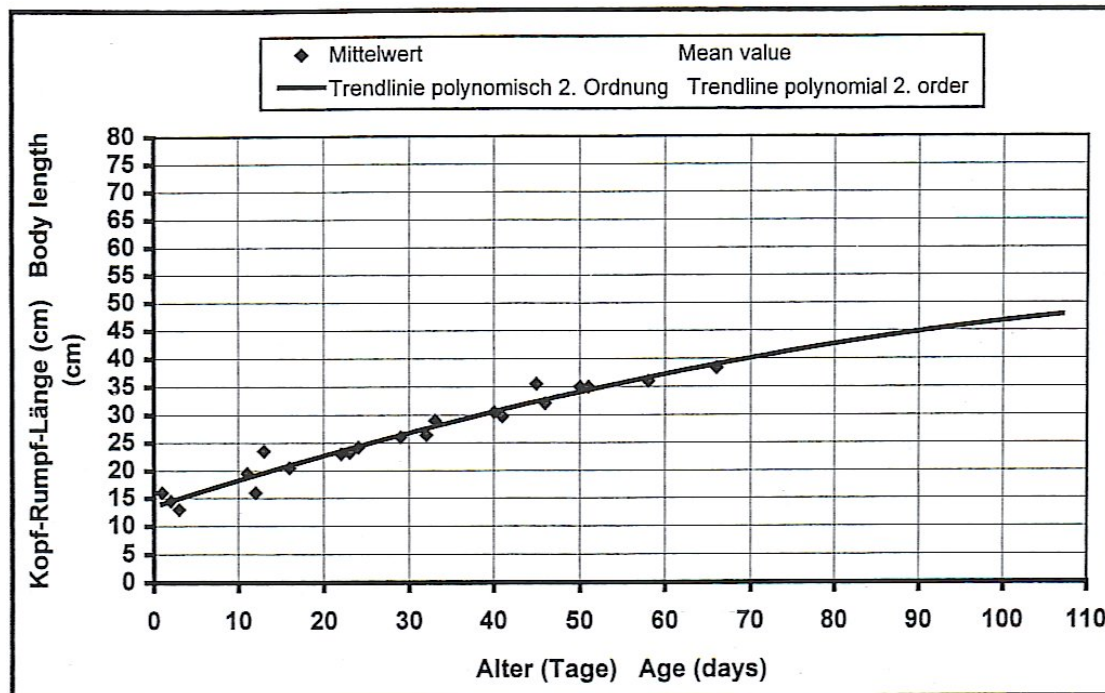


Figure 8. Mean values for increase in body length of all cubs measured (n=14)

As is shown in Figure 9 there is little difference between the 8 males and 6 females.

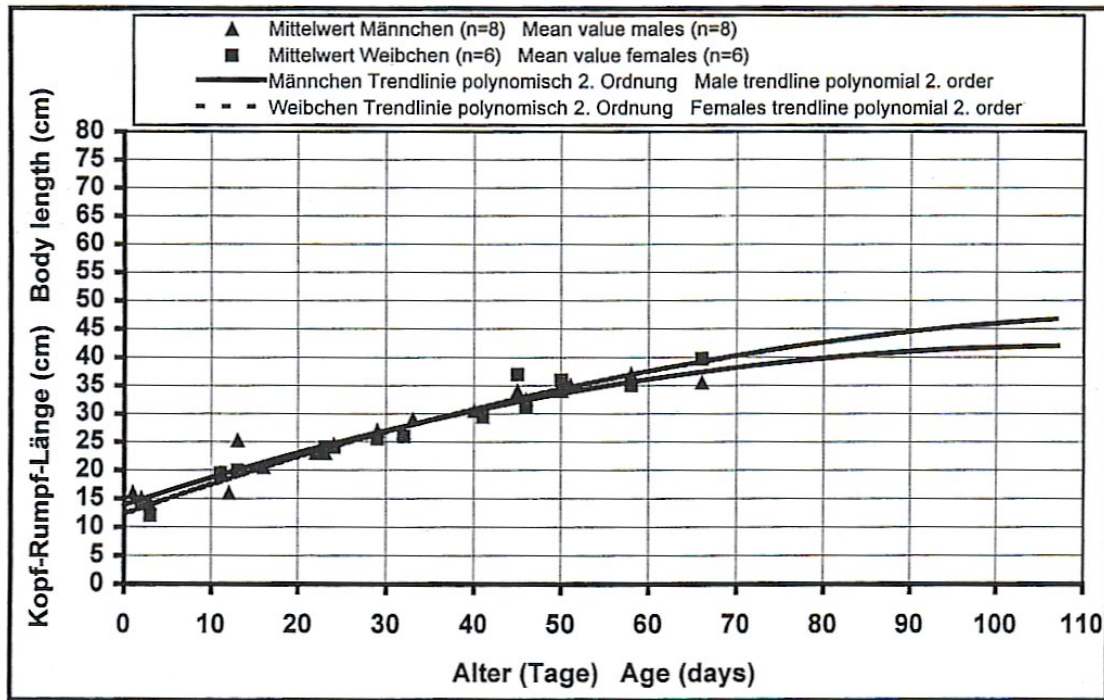


Figure 9. Mean values for sex specific increase in body length

DISCUSSION

Because of the small and heterogeneous database extensive statistic analysis was not possible. As stated the intention of this paper is to show trends and to encourage other institutions to collect comparable data to widen the database.

As was obvious from Figure 1 the 229 records of weight form the basis for the trend for weight increase during the first 107 days of life, but the ratio of data for males and females is inadequate for analysis of sexual differences. The spread of the data is not optimal for analysis of development over time. Lastly the number of litters is too small for a comparison of differences in weight increase related to the number or sex ratio of cubs in the litter or the influences of different parental combinations on the development.

The data so far available does not indicate a significant difference related to the latter factors. There have been all female litters, which are heavier than all male litters and *vice versa*. The weight of single cubs is not automatically heavier than twin or triplet cubs, but in the 4 mixed sex litters males were heavier than females, individually and on average. However these are preliminary data (Figure 10).

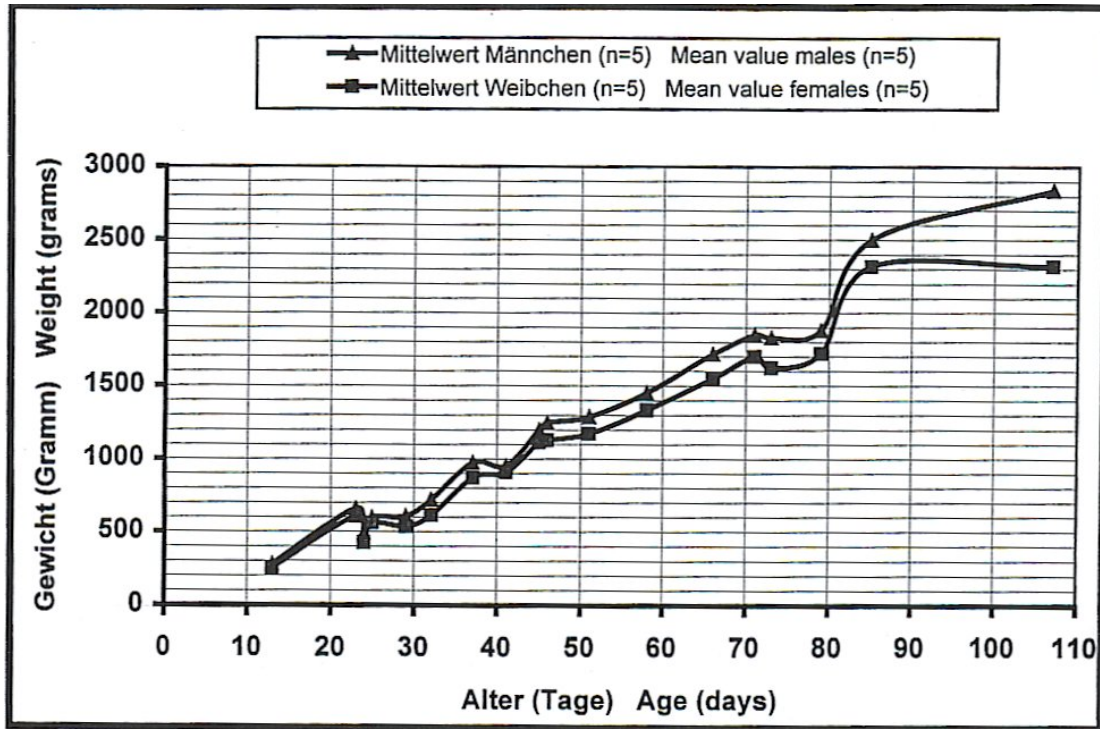


Figure 10. Sex specific increase in weight in mixed sex litters shown as a curve of measuring points with interpolated lines

It is too early for a detailed analysis of the increase in length for two reasons; as described in the methods measurements of length are less reliable than weights and the data is not evenly spread over time, with the few recorded after 79 days being for females only (Figure 2). Figure 3 shows that the data for body length are even fewer and relate only to the first 66 days.

These data are published at this stage because, incomplete as they are, it is better to have some guide to estimating age of otter cubs than to have none. Using the curves given in Figures 4,6 and 8 it should be possible to estimate the age of orphaned wild cubs younger than four months with an accuracy of plus or minus 10 days. For older cubs the age determination criteria given by HEGGBERGET (1996) will be useful.

The question remains as to whether wild cubs show the same trend of weight and length gain as captive born cubs. However this will remain unanswered unless comparable data from wild born cubs with known birth dates can be obtained, which is not likely.

When using these data for an estimation of the age of cubs found in the wild it should be kept in mind that in many cases cubs might have lost weight before being found. This can happen very rapidly. GREEN (pers. comm.) found a decrease of weight in two orphaned cubs from 210 to 190 and 240 to 170 grams respectively during the first day after they were found.

The second reason for publishing these data is to encourage other institutions breeding *L. lutra* to measure their cubs and share the data. Although only 10 % of institutions participating in the Eurasian otter studbook are successfully breeding the species, in 1996 the birth of 47 cubs was registered in the EEP annual report (MELISSEN, 1998). If only a few of the institutions involved were able to measure their cubs without undue disturbance the amount of data available would be much greater. It is not worth risking the lives of animals to obtain data so measurements should only be made if the risk and disturbance is minimal. However, recording data from stillborn cubs or those dying after birth, should be mandatory.

If information is sent to Aktion Fischotterschutz to expand the database additional data required are: - sex, exact date of birth, date of measurements, weight in grams, total and body length in centimetres, information on circumstances which may have had a bearing on physical development (illnesses, hand-rearing, vaccination), size and sex ratio of litter, name and studbook number of parents and age and breeding history of the mother.

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Resumen: Desarrollo en peso y longitud de las crías de la nutria eurasiática (*Lutra lutra*)

Se tomaron medidas de longitud y peso de 32 crías de nutria eurasiática. Durante los primeros 20 días las crías duplicaron su peso cada 10 días y a partir de entonces un promedio de 300 g cada 10 días. Estos datos concuerdan con los obtenidos por Green, quien registró el aumento de 200 a 400 g en 10 días y de 400 a 800 g en doce días en dos crías recogidas de la naturaleza. En los 10 días siguientes estas aumentaron otros 275 g, y otros 300 en los 7 días subsiguientes, alcanzando los 3000 g en 99 días. El desarrollo en peso es aproximadamente el mismo en los 2 sexos, con un incremento un poco mayor en los machos durante el 40° y 105° día de vida. Todos los animales (n=30) fueron pesados dentro de los primeros 107 días de vida. Durante este período también se tomaron medidas de longitud total de 26 crías. La curva de crecimiento en longitud es diferente a la de peso. Durante el primer mes los animales crecen aproximadamente 7 cm cada 10 días, 6 cm cada 10 días durante el segundo, 4 cm cada 10 días en el tercero, y 2 cm cada 10 días durante el cuarto. También se midió la longitud del cuerpo de 14 crías durante sus primeros 66 días de vida. La curva muestra un crecimiento más constante de 3 a 5 cm cada 10 días. El objetivo de este trabajo fue mostrar tendencias primarias a pesar de no contarse con datos que permitieran análisis estadísticos extensivos. No se encontraron tendencias evidentes en el desarrollo del peso en relación con el número de crías por camada, relación de sexos o la combinación de padres. El peso de animales nacidos en camadas de un solo individuo no parece ser automáticamente mayor que el de individuos de camadas más numerosas. En promedio los machos fueron más pesados que las hembras. Los resultados preliminares de este estudio podrían permitir estimar la edad de crías silvestres huérfanas con menos de 4 meses de edad con una exactitud de aproximadamente 10 días. En estos casos debe tenerse en cuenta que crías encontradas en la naturaleza pueden haber perdido peso antes de ser halladas. Green registró un decrecimiento en el peso de 210 a 190 g y de 240 a 170 g en dos crías huérfanas durante el día posterior a haber sido encontradas.