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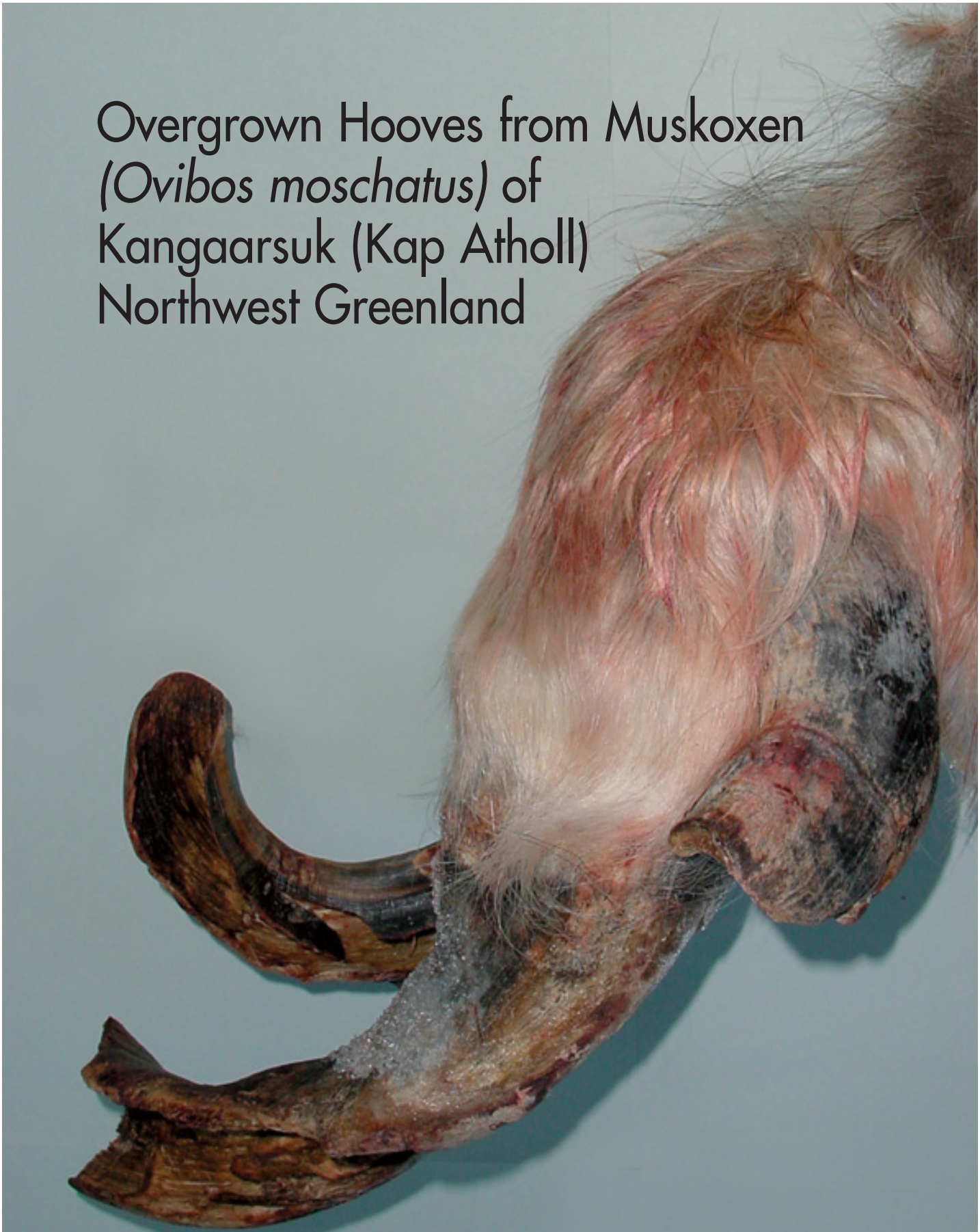

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# Overgrown Hooves from Muskoxen (*Ovibos moschatus*) of Kangaarsuk (Kap Atholl) Northwest Greenland

by
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## *Summary*

In 1986, 7 muskoxen (5 females, 2 males) were introduced to Kangaarsuk/Kap Atholl (76° 19′ N, 69° 22′ W), Qaanaaq municipality, Northwest Greenland. Hunting has never been allowed. This 1998 study focused primarily on the overgrown hooves of muskoxen at Kap Atholl. Also noted or studied were fat reserves, horn growth, mandible measurements and tooth wear.

14 Kap Atholl muskoxen were collected on 16 & 17 April 1998; 6 adults, 7 sub-adults and 1 yearling. One female was 13 years old; being one of the original animals introduced to Kap Atholl. Hooves on all adults were severely overgrown, e.g., fore hooves 25 to 49 cm long. Hooves on sub-adults were longer than expected, e.g., fore hooves 15 to 27 cm long. Normal adult and sub-adult fore leg hoof length is 16.1 ± 2.0 cm (n = 32). Severely overgrown hooves on the 4 adult bulls did not appear to impede locomotion on the hard surfaced snow. Veterinary examination of animals did not reveal any pathogenic cause for the deformed hooves.

Kap Atholl muskoxen have large body size, excellent teeth and good body condition. They also have dry flaky horns. What causes the deformed overgrown hooves has not been shown, nor any reason for the dry flaky horns. The overgrown hooves and dry flaky horns are likely the result of a common cause. The responsible factor(s) remains to be identified, candidates include, 1) high concentrations of a nutrient in the vegetation, 2) lack of locomotion and abrasion, and 3) a possible genetic inbreeding defect.



## *Eqikkaaneq*

Umimmaat arfineq-marluk (kulavaat tallimat tiggaallu marluk) Qaanaap Kommuneani Kangaarsummut (76° 19′ N, 69° 22′ W) 1986-mi nuunneqarput amerliartornissaallu siunertaralugu eqqissisimatitaallutik. Umimmaat taakku qanoq innerat Avatangiisinut Pinngortitamullu Pisortaqarfiup Pinngortitaleriffiullu suleqatigiinnerisigut 1998-mi misissorneqalerpoq. Tunuliaqutaasoq tassaavoq umimmaat tamaangaaneersut kukiffaasa naliginnaasumit anginerulerlutik iloqissersimasut naammattoorneqartalersut misissuiffiginissaat. Misissuinermi aallaavigineqartut taakkuupput iluatsilluguli ilanngullugu misissorneqarput tunnoqassusiinut, nassuinut, qarngannut kingutaannullu tunngasut.

1998-mi aprilip qiteqqunnerani Kangaarsummi umimmaat 14-it pisarineqarput tassalu inersimasut arfinillit, inuusukaat arfineq-marluk norrarlu ataaseq. Pisarineqartut ilagaat kulavak ukiunik 13-nik utoqqaatigisoq 1986-mi nuunneqartut ilaat. Inersimasuni tamani kukiffaat isikkumikkut allanngorsimanerat malunnarluarpoq. Assersuutigalugu siulliivini kukiffaat 25-49 cm-terisut angitigaat. Angutivissat arnavissallu inuusunnerusut kukiffaat ilimagisamit takinerupput 15-27 cm-terisut takitigigamik. Umimmaat siulliivini kukiffaat takissusaat – inersimasuni inuusunnerusunilu – naliginnaasoq tassaagajuppoq 16,1 +/- 2,0 cm (n=32). Tigganni sisamani kukiffaat allanngungaatsiarsimanerat apummi manngersumi pangalinnissaannut akornutaarpasinngilaq. Uumasut nakorsaata misissuinerata takutippaa kukiffaat isikkumikkut allanngorsimanerat nappaammik pissuteqarani allamik patsiseqarsimassasoq.

Kangaarsummiittut umimmaat timaat naliginnaasumit angineruppu t kingutaat nungullarpiarsimanatik tunnoqarluarlutillu. Tiggaat kulavaallu ilarpaaluisa nassui qulloorsimapput panernerannik nassuiaatissaqarunartumik.

Kukiffaasa allanngorsimanerannut nassuisalu qulloorsimanerannut pissutaasinnaasut misissornissaat periarfissaqarsimanngilaq, patsisaasorli ataasiugunarpoq. Sunniuteqarsimasinnaasut misissugassat makkuusinnaapput 1) nerisaasa akuisa ilaasa tiggaat kulavaallu nassuinik kukiffaannillu sunniisinnaasut annertusisimanerat 2) uumasut nikippiartannginnerisa kukiffaannik nungullartitsisarnerat, 3) uumasut avataaneersunik akuneqartannginnerisa kinguneranik innarluutinngorsimasinnaanera.

## *Sammenfatning*

I 1986 blev 7 moskusokser (5 køer og 2 tyre) udsat ved Kangaarsuk/Kap Atholl (76° 19′ N, 69° 22′ W) i Qaanaaq kommune, Nordvestgrønland. Okserne blev fredet for at muliggøre vækst i bestanden. I 1998 gik Direktoratet for Miljø og Natur og Grønlands Naturinstitut sammen om en undersøgelse af bestanden. Baggrunden var de forvoksede klove, som blev observeret hos moskusokser fra dette område. I undersøgelsen blev der derfor også hovedsageligt fokuseret på oksernes forvoksede klove, men oksernes fedtreserver, hornvækst, kæbemål og tandslidtage blev også undersøgt.

Medio april 1998 blev 14 moskusokser nedlagt ved Kap Atholl; 6 voksne dyr, 7 ungdyr og 1 årskalv. En af køerne var 13 år gammel og er en af de "oprindelige" okser, som blev udsat i 1986. Klovene på alle de voksne dyr var meget forvoksede - eksempelvis var klovene på forbenene 25-49 cm lange. Klovene på ungdyrene var længere end forventet - de var 15-27 cm lange. Den normale længde for klove på forben af moskusokser er 16,1 ± 2,0 cm (n = 32) for både voksne og unge dyr. De meget forvoksede klove på de 4 voksne tyre forhindrede tilsyneladende ikke dyrene i at løbe på det hårde snedække. Dyrlægens undersøgelser viste, at de misdannede klove må skyldes andre årsager end sygdom.

Moskusokserne ved Kap Atholl havde relativt stor kropsstørrelse, meget lidt tandslidtage og gode fedtreserver. Desuden var hornene flækket på en del af okserne, hvilket formentlig skyldes udtørrede horn.

Det har ikke været muligt i denne undersøgelse at afdække årsagen(erne) til de misdannede klove og de flækkede horn. Årsagen er muligvis den samme. De mulige ansvarlige faktor(er), som kunne undersøges videre, inkluderer, 1) forhøjede koncentrationer af stoffer i vegetationen, der påvirker vækst af horn og klove hos okserne, 2) manglende bevægelse og dermed nedslidning af klove, og 3) en genetisk indavlet defekt.

# *Introduction*

Muskoxen (*Ovibos moschatus*) may once have been indigenous to Kangaarsuk /Kap Atholl in the Qaanaaq region of Northwest Greenland. Extremely old muskox craniums, bones and horns have been found in the area (Burnham pers. comm.). In the late 20th Century, however, muskoxen were not present. On July 11th 1986 a total of 7 year-

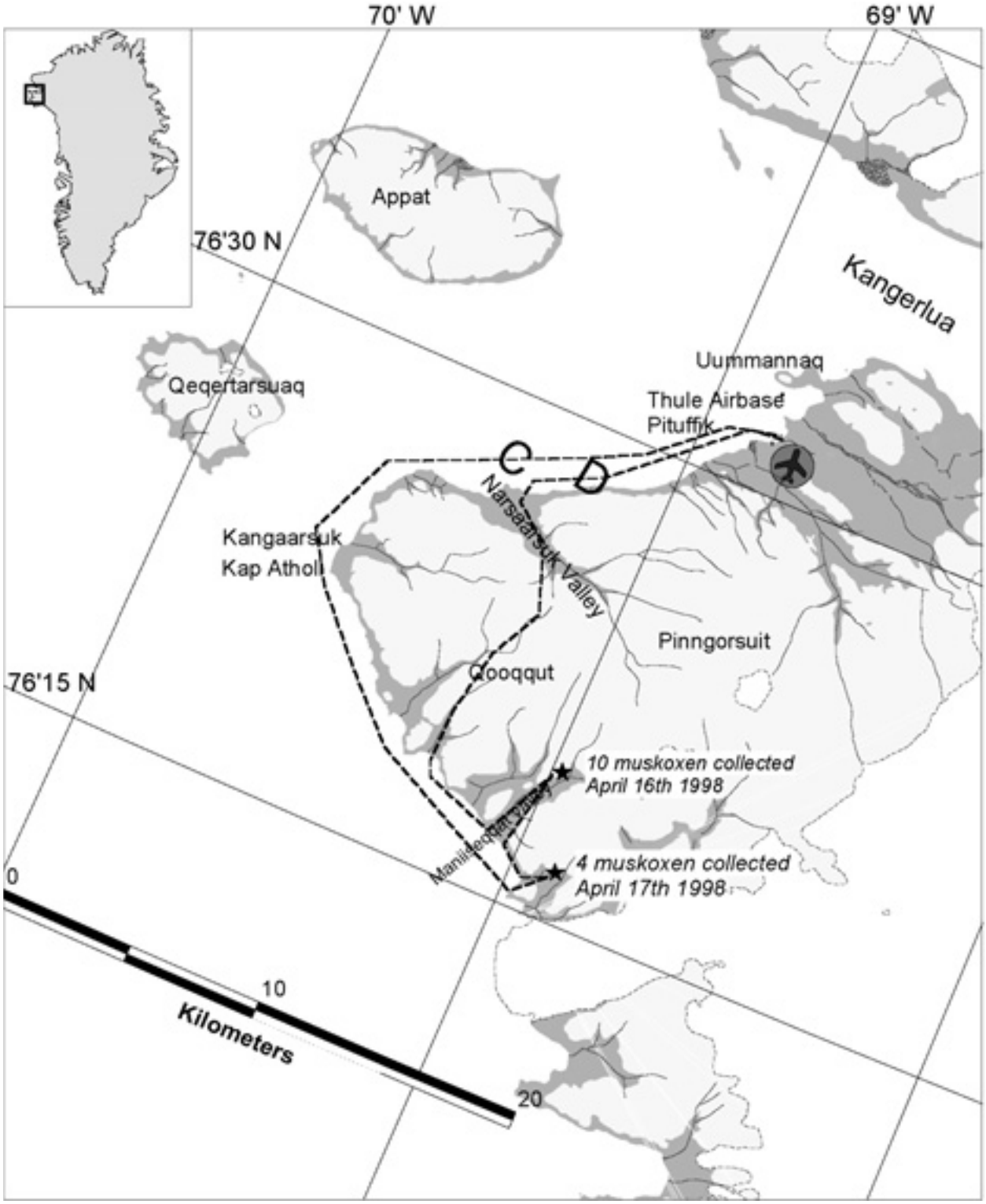


***Figure 1.*** *Map of the study area indicating where 14 muskoxen were sampled in 1998.*

ling muskoxen (2 males and 5 females) were taken from the Kangerlussuaq area and introduced to Kap Atholl. Since their release the muskoxen have been protected by law.

By 1990 all of the muskox resided in the Maniisergat Valley, which is also called "Den Grønne Dal" (The Green Valley) (Figure 1). The valley is named for its lush vegetation, which results from the many large colonies of Little Auk (*Alle alle*) found there. During summer, muskoxen are usually found in the dense grassy areas under the bird colonies. The vegetation there is lawn-like with a deep layer of peat below and few stones to cause chipping or wear on hooves (Burnham 1996).

Calving was first reported in 1991, when a group of 7 muskox including 2 calves was seen (Peter Nielsen pers. comm.). Muskoxen were again observed in spring 1993. This time 6 animals, which included calves, were seen deep in the Narsaarsuk Valley (Ole Mathiesen pers. comm.). The Peregrine Fund, working in the Kap Atholl region during July 1994, observed 1 lone bull and a herd of 19 muskoxen, which included 7 calves (Burnham 1996). This sighting was confirmed in August of the same year during an aerial survey completed by the Directorate for Health and Environment (Peter Nielsen pers. comm.). The next year, 1995, 2 lone bulls and a herd of 24 muskoxen, which included 7 calves were seen (Burnham 1996).

In the summer of 1996 a herd of 33 muskoxen, which included 8 calves, were sighted in the Maniisergat Valley, and severely overgrown hooves, grown up and around 360°, were noted on many adults (Burnham 1996). The worst affected animals had difficulty walking. Veterinarian Niels Wøldiche Pedersen investigated the situation in November 1996 (unpublished data). He located a herd of about 30 muskoxen, of which 5 to 10 of the oldest animals had difficulty walking. They had severely overgrown hooves, which looked similar to corkscrews and caused abnormal leg position. One of the adult bulls was collected. All 4 hooves were overgrown, with the foreleg hooves being worst and longest, e.g., the corkscrew-like front hooves measured 50 cm and 44 cm. Body condition was considered below average, however, no pathological changes were found in the digestive system.

By July of 1997 the original single herd had split in two and as before there were some lone bulls (Burnham pers. comm.). The total was 47 muskoxen, which included 12 calves, and between 7 to 12 adults had severe hoof problems (Burnham pers. comm.). Muskoxen with overgrown hooves could be found in both the Narsaarsuk and Maniisergat Valleys of the Kap Atholl region (Anette Grøngaard pers. comm.).

Adult muskoxen within this introduced population of the Kangaarsuk/Kap Atholl area of Northwest Greenland had been observed to possess long curled hooves. Local opinion held that the overgrown hooves caused suffering, we therefore investigated the problem by collecting overgrown hooves in the Kap Atholl area of Northwest Greenland in April 1998. This report presents the findings from that study. Several comparisons are made to measurements typical of normal adult muskox of the founding Kangerlussuaq stock.

# *Methods*

During spring 1998, 14 muskoxen were shot at Kangaarsuk/Kap Atholl in Northwest Greenland (76° 19′ N, 69° 22′ W) (Figure 1). Hunters from the town of Qaanaaq were responsible for the collection, and were accompanied by wildlife officers Hans Mølgaard (Sisimiut Municipality) and Jacob Heilmann (Maniitsoq Municipality). Transport was by dog sled. General observations about the Kap Atholl terrain surface and vegetation were made. Although instructed to shoot 15 adults, all muskoxen seen were shot regardless of age.

An entire herd of 10 animals was collected deep inside the Maniisergat Valley (76° 20′ N, 68° 52′ W) on April 16th. The next day, April 17th, a group of 4 bulls was collected further south inside a small un-named valley (76° 16.5′ N, 68° 54′ W). The mandibles from 13 animals and the hooves from 14 animals were sent to the Greenland Institute of Natural Resources for examination and measurement. Samples of mandible and hooves of each animal were kept together and were labelled after arrival at the institute. All mandible and hoof samples were then given tags indicating region (KPA), collection year (98), and an animal number (1 to 14), e.g., KPA98-1,-2,-3,…-14.

All hooves were photographed (Appendix 4). Hoof length measurements were taken along the distal border of the abaxial wall, starting at the coronet (transition line between skin and hoof) and ending at the toe of the hoof (Figure 2). The maximum hoof length for each foot was the measurement chosen. Since the hooves on the oldest animals curled onto themselves extensively, the length of the hoof sole was not taken.

All mandible, diastema and tooth wear measurements were taken on the left mandible, buccal side (unless otherwise specified). Tooth crown height on first incisor (I1) and the anterior crest of the first molar (M1) were measured for tooth wear. Mandible length was used to indicate the sex of the muskoxen collected, the males being longer. Age was indicated by tooth eruption (Carsten Riis Olesen unpublished). Since muskoxen typically are born during May and all animals were collected in April, an animal of almost 4 years would be put in the 3 to 4 year old age class. An animal of almost 3 years would be put into the 2 to 3 year old age class, etc. Those with a full set of adult teeth were placed in the > 4 years old age class. Cementum rings from the interior of the second and third molar (Mads C. Forchhammer unpublished) were used to age the Kangerlussuaq female, whose incisors and molar tooth row are shown in the results.

Overgrown hooves from two Kap Atholl adults were sent for further analysis to the Laboratory of Veterinary Pathology, Royal Veterinary and Agricultural College, Institute of Pharmacology and Pathology, Denmark. At this laboratory the hooves were x-rayed and examined anatomically.

For the purposes of comparison, hoof length measurements and jawbones were collected from muskoxen in the Kangerlussuaq area of West Greenland (ca. 67° N; 51° W), where overgrown hooves are not a problem. Hoof measurements were obtained from 13 and jawbones from 17 muskoxen during the Kangerlussuaq winter hunt February 2001. The Kangerlussuaq sample was opportunistic and included 4 adults, 4 sub-adults and one calf (Table 3). The student t-Test, assuming unequal variance with two-tailed

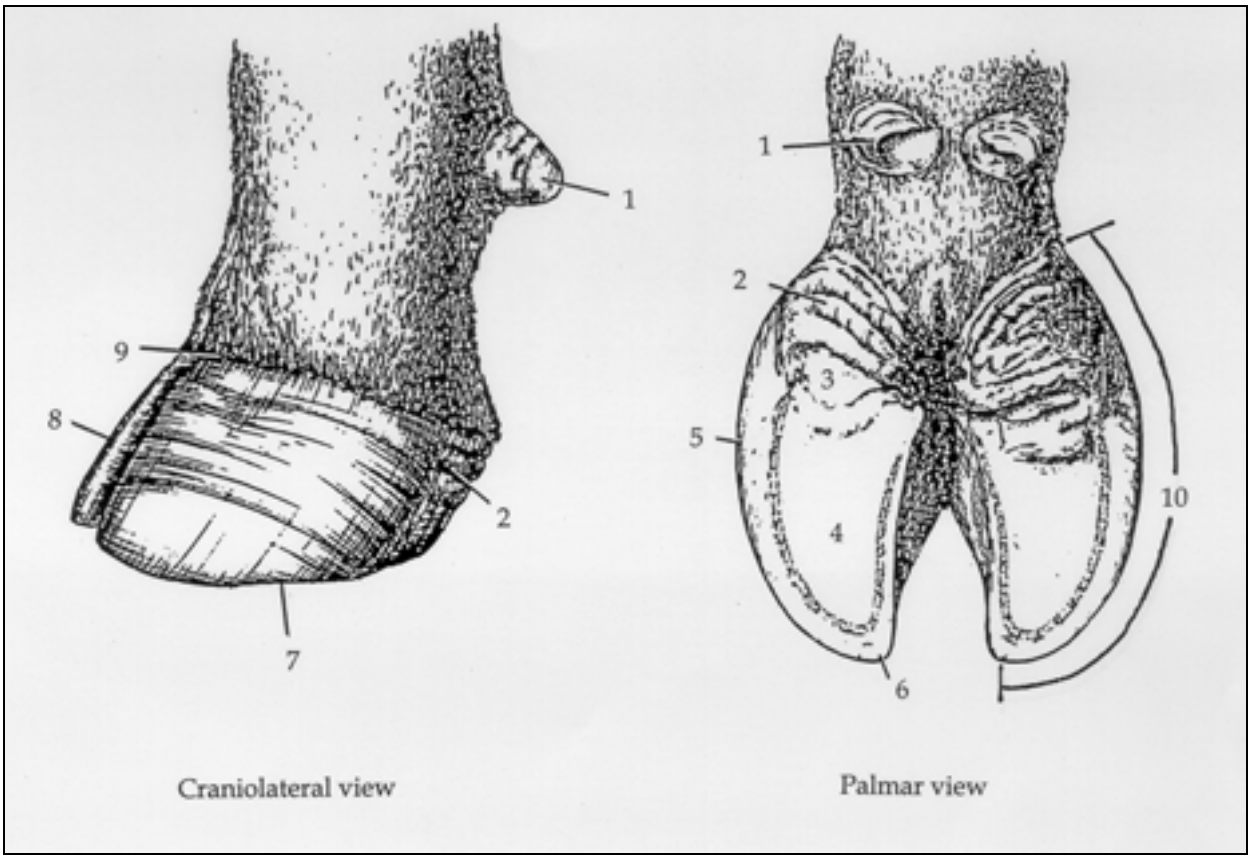


***Figure 2.*** *External hoof anatomy (from Pasquini 1982) and hoof length measurement. 1) Dew claw, 2) Bulb of heel, 3) Heel, 4) Sole, 5) Abaxial wall, 6) Toe, 7) Distal border, 8) Dorsal border, 9) Coronet (transition line from skin to hoof), and 10) hoof length measurement.*

p-values was used to ascertain significant differences between the Kap Atholl and Kangerlussuaq muskoxen samples.

## *Results*

At Kap Atholl the hunters saw and shot 14 muskoxen, which included 6 adults, 7 sub-adults and 1 yearling (Table 1). An adult female taken, KPA98-5, possessed an ear-tag, number 331. This marked her as one of the original animals released at Kap Atholl in 1986, and identified her age as 13 years. The animal KPA98-12, which lacked a mandible, was grouped with the >4-year old males because it belonged to the group of 4 reported adult bulls. Also, hoof measurements for this animal were comparable to the other adults.

The foreleg hooves were more overgrown than hind-leg hooves. The greatest deformity and overgrowth was found on the hooves of the 6 adults collected (Table 2). Split or broken toes were apparent on some of the hooves. The dew claws were also over-grown, with lengths of 8 to 10 cm not uncommon. Photos of overgrown hooves are shown in appendix 4.

**Table 1.** *Sex and age of muskoxen collected at Kap Atholl during spring 1998.*

| Age (years) | Male (n) | Female (n) | Unknown (n) |
|---|---|---|---|
| Adult > 4 | 3 | 3 | |
| 3 to 4 | 1 | | |
| 2 to 3 | | 2 | |
| 1 to 2 | 1 | 3 | |
| < 1 | | | 1 |

**Table 2.** *Length of overgrown hooves of 14 muskoxen collected during spring 1998 at Kap Atholl.*

| Age (years) | n[1] | Length of foreleg hoof ( $\bar{x}$ ± SD; range ) | Length of hind-leg hoof ( $\bar{x}$ ± SD; range ) |
|---|---|---|---|
| Adult > 4 | 12 | 33.0 ± 6.5 cm; (25 to 49) | 22.8 ± 4.7 cm; (17 to 31) |
| 3 to 4 | 2 | 26.5 ± 0.5 cm; (26 to 27) | 20.75 ± 0.25 cm; (20.5 to 21) |
| 2 to 3 | 4 | 21.4 ± 3.8 cm; (18 to 26) | 16.6 ± 3.2 cm; (13 to 20) |
| 1 to 2 | 8 | 18.1 ± 1.9 cm; (15 to 20) | 14.9 ± 1.6 cm; (14 to 18) |
| < 1 | 2 | 15.25 ± 0.25 cm; (15 to 15.5) | 12.1 ± 0.1 cm (12 to 12.2) |

[1] Sample size double, because two fore- and hind-leg hooves per muskox.

**Table 3.** *Length of normal hooves of muskoxen collected during winter 2001 at Kangerlussuaq.*

| Age (years) | n | Length foreleg hoof ( $\bar{x}$ ± SD ) | Length hind-leg hoof ( $\bar{x}$ ± SD ) |
|---|---|---|---|
| Adult > 4 | 16 | 16.1 ± 1.9 cm | 13.8 ± 1.4 cm |
| Sub-adult < 4 | 16 | 16.0 ± 2.2 cm | 13.1 ± 1.7 cm |
| < 1 | 2 | 14.5 ± 0.5 cm | 12.5 ± 0.5 cm |

Muskoxen from the Kangerlussuaq region had foreleg and hind-leg hoof lengths that were significantly below ($p < 0.005$) those typical for Kap Atholl muskoxen (Tables 2 & 3). Calves were the only exception.

The teeth of the Kap Atholl muskoxen showed little tooth wear compared to Kangerlussuaq muskoxen (Table 4). Unlike Kangerlussuaq, few tooth roots were visible on any incisor or molar teeth from Kap Atholl muskoxen. The 13 year-old female from Kap Atholl had a first incisor tooth crown height of 10 mm, which showed wear on the buccal surfaces only. In contrast a 12 year-old female from Kangerlussuaq had first incisors, which were worn down into their roots (Figure 3). The difference between Kap Atholl and Kangerlussuaq incisor tooth crown height was significant ($p < 0.0005$ adults and $p < 0.01$ sub-adults). Similarly molar tooth crown heights were also greatest in Kap Atholl muskoxen. Adults averaged 7 mm more than their Kangerlussuaq counterparts. The difference was significant for adults ($p < 0.0001$), but not for sub-adults ($p > 0.05$). Figure 4 illustrates the molar tooth wear difference between two mature adult muskoxen, one from Kap Atholl and the other from Kangerlussuaq. The occlussal surfaces of the Kap Atholl molars and the crests themselves show little wear, while tooth wear is well advanced on the Kangerlussuaq teeth.


*Kap Atholl 13 year old female. Remaining tooth crown excellent.*

*Kangerlussuaq 12 year old female. No tooth crown remaining just roots.*

***Figure 3.*** *Incisor tooth wear Kap Atholl versus Kangerlussuaq muskox. (Photos C. Cuyler)*

*Kap Atholl 13 year old female.*

*Kangerlussuaq 12 year old female.*

***Figure 4.*** *Molar tooth wear Kap Atholl versus Kangerlussuaq muskox. (Photos C. Cuyler)*

**Table 4.** *Maximum tooth crown height for muskoxen from Kap Atholl and Kangerlussuaq.*

| Tooth & Age | n | Kap Atholl[1] | n | Kangerlussuaq |
|---|---|---|---|---|
| Maximum tooth crown height I1 ( $\bar{\chi}$ ± SD ) | | | | |
| > 4 years | 5 | 10.9 ± 1.9 mm | 16 | 4.1 ± 4.2 mm |
| < 4 years | 3 | 13.2 ± 0.8 mm | 12 | 10.8 ± 1.5 mm |
| Maximum tooth crown height M1 anterior crest ( $\bar{\chi}$± SD ) | | | | |
| > 4 years | 5 | 19.9 ± 1.9 mm | 16 | 12.0 ± 4.5 mm |
| < 4 years | 3 | 18.0 ± 0.8 mm | 12 | 16.9 ± 0.9 mm |

[1] Two Kap Atholl animals are not included in the table. These are the yearling and the adult male KPA98-12, whose mandible was not available.

**Table 5.** *Mandible & diastema lengths for muskoxen from Kap Atholl and Kangerlussuaq.*

| | | Kap Atholl[1] Male | | | Kangerlussuaq Male | |
|---|---|---|---|---|---|---|
| **Age (years)** | **n** | **Mandible** | **Diastema** | **n** | **Mandible** | **Diastema** |
| > 4 | 2 | 40.3 ± 0.4 cm | 11.6 ± 0.6 cm | 7 | 38.4 ± 1.1 cm | 10.5 ± 0.4cm |
| 3 to 4 | 1 | 38 cm | 11.6 cm | 5 | 36.0 ± 0.6 cm | 9.6 ± 0.3 cm |
| 2 to 3 | 0 | | | 0 | | |
| 1 to 2 | 1 | 31.4 cm | 10.1 cm | 2 | 32.9 ± 0.3 | 8.7 ± 0.3 cm |
| | | **Female** | | | **Female** | |
| **Age** | **n** | **Mandible** | **Diastema** | **n** | **Mandible** | **Diastema** |
| > 4 | 3 | 36.6 ± 0.5 cm | 10.4 ± 0 cm | 9 | 35.4 ± 0.5 cm | 9.4 ± 0.2 cm |
| 3 to 4 | 0 | | | 7 | 33.2 ± 1.4 cm | 8.6 ± 0.3 cm |
| 2 to 3 | 2 | 32.1 cm (n = 1) | 9.3 ± 0.2 cm | 0 | | |
| 1 to 2 | 3 | 30.1 ± 0.2 cm | 9.0 ± 0.2 cm | 0 | | |

[1]Two Kap Atholl animals are not included in the table. These are the yearling of unknown sex and the adult male KPA98-12, whose mandible was not available.

Mandible and diastema lengths in the Kap Atholl sample were greater than in Kangerlussuaq muskoxen (Table 5). Due to small sample size, significance was tested only for adults. Kap Atholl mandibles were significantly longer in both females and males ($p < 0.05$ for each). For females, the Kap Atholl diastemas were significantly longer than in Kangerlussuaq females ($p < 0.0001$). Although diastemas were also greater in the Kap Atholl males, no significant difference was found.

All Kap Atholl animals collected had excellent fat reserves regardless of the state of their hooves (no measurements taken). The group of 4 bulls was first observed for approximately 30 minutes on 17 April. Although their hooves were severely overgrown, this did not appear to impede or hinder movement over the snow and rocks. The bulls ran lightly and quickly. Their running pace and agility were similar to muskoxen from the Kangerlussuaq area of West Greenland.

Laboratory examination of the hooves did not reveal any pathogenesis (Henrik Jensen pers. comm.). Hooves from the 2 adult animals showed little wear. The animals appeared to have walked upon the bulb or heel of their hooves. X-rays revealed no changes in bone structure that could have caused the overgrown hooves, neither were any deformities of the bones caused by the hooves observed.

The muskox horns were dry, with pieces flaking and breaking off. Specifically the horn tips appeared chipped away so that these were shortened and thin (Figure 5). The mature bulls, which typically have a wide thick forehead horn covering, had “dry” underdeveloped horn growth over their foreheads.

The terrain of Kap Atholl where April collection of muskoxen occurred was characterized as stony and hard surfaced (Figure 6). Mountains in the area are bird cliffs used in summer by Little Auk.

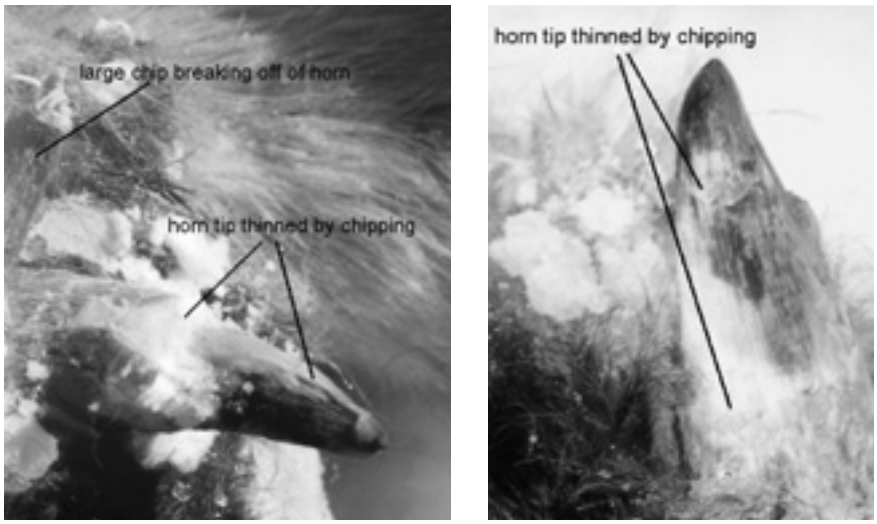


***Figure 5.*** *Dry, flaking, and splitting horns on Kap Atholl muskoxen, April 1998. (Photos H. Mølgaard)*

***Figure 6.*** *Rocky terrain in upper Maniisergat Valley where 10 of the muskoxen (several shown) were collected 16 April. (Photos H. Mølgaard)*

## *Discussion*

The collection totalled all 14 animals actually seen, and included adults, sub-adults and 1 yearling. Excepting the yearling, all ages showed abnormally long hooves relative to what is typical in the Kangerlussuaq muskox population. Unlike the short rounded hooves typical of muskoxen, Kap Atholl hooves often exhibited severe curling upon themselves. Foreleg hooves could be up to 49 cm long and hind-leg hooves up to 31 cm. Dew claws were also extremely long, and they too often curled. Although Burham (1996) suggested the problem might solve itself with more frequent and greater distances travelled by the animals, it is unlikely that any amount of subsequent abrasion alone could wear down hooves as overgrown as those observed at Kap Atholl.

Is Kap Atholl unsuitable habitat for muskoxen? Old skull and bone remnants attest to the presence of muskoxen in earlier times, but do not give any clues as to their demise. Summer grazing at Kap Atholl has been described as lush and green (Burnham 1996). Quality of the winter grazing in the Kap Atholl area appears sufficient, since all animals collected had what was qualitatively described as excellent fat reserves. The Kap Atholl muskoxen are able to attain relatively old age. One female was 13 years old.

Since their 1986 introduction, the herd has shown a healthy growth in total numbers to c. 50 animals. All of the above indicate a suitable habitat.

The Kap Atholl muskoxen were of good body condition, and their mandible lengths were greater than in Kangerlussuaq animals, which indicates larger body size. Their large size is likely the direct result of inhabiting better range at a lower population density than their southern cousins of Kangerlussuaq. Although not measured quantitatively, the fat reserves of the Kap Atholl muskox collected were noted as being excellent in comparison to that normally seen during the Kangerlussuaq winter muskox hunt (H. Mølgaard unpublished). Tooth wear was also negligible in the Kap Atholl collection. Good teeth permit optimal utilisation of ingested forage (Skogland 1988, 1994). Older animals seldom achieve this due to advanced tooth wear. Given their good teeth, old Kap Atholl muskoxen would not suffer from poor digestion. All of the above indicates large healthy animals. Since the animals with overgrown hooves have excellent body condition, their supposed suffering it is not apparent, and there is little justification to destroy these animals.

If Kap Atholl produces such large healthy animals, what could be causing the deformed overgrown hooves? Burnham (1996) proposed that the overgrown hooves resulted because the lush summer pastures made movement unnecessary to obtain food, and the pasture's spongy nature could provide little wear. Leg-bone deformities and disease were also proposed as possible causes. The pathological examination of the Kap Atholl hooves, however, did not support these suggestions, and Professor Henrik Jensen (unpublished 1998) concluded that a lack of sufficient abrasion and wear were the probable causes. Pedersen (unpublished 1996 data) also concluded that the overgrown hooves resulted from insufficient hoof wear in a soft terrain. However, this cannot account for dry flaky horns.

Is the habitat too rich in a specific nutrient? Each summer numerous little auk colonies drop copious amounts of nitrogen rich dung, which fertilises the vegetation eaten by the muskoxen. Pedersen suggested that this nitrogen might be linked to the abnormal hoof grown. Could the nitrogen also be causing the abnormal horns observed on the Kap Atholl muskoxen? Muskox horns are usually thick and strong, while Kap Atholl muskoxen had thin, dry and flaky horns. Compared to observations of horn growth in the Kangerlussuaq area, even the old bulls had "thin" underdeveloped horn growth on their foreheads. If some nutrient in the vegetation was adversely affecting hoof growth, it is conceivable that horn growth would be affected too.

Finally, could an inherited defect be responsible for the overgrown hooves. Was the founding stock too small? An occasional defective hoof-growth gene within the Kangerlussuaq muskox population may be present. On 22 February 2000, a young female muskox was shot near the Bios cabin, Ørkendalen Valley, Kangerlussuaq (66° 57.5′ N, 50° 13.5′ W). Her foreleg hooves measured 23 and 26 cm, while the hind-leg hooves measured 13 and 22 cm (Cuyler unpublished data). All muskoxen at Kap Atholl are descendants from the 1986 introduction of seven animals, only 2 being males, from the Kangerlussuaq muskox population. If one or more of these animals possessed a genetic defect, the result could be a majority with overgrown hooves as presently observed.

Despite the above speculations into various theories, the cause of the overgrown hooves among the muskoxen at Kap Atholl is still unknown. Further investigations to ascertain possible inbreeding could include: 1) locating and examining the original introduced (eartagged) individuals still alive to learn if the problem is constant; and 2) locate and examine all family groups at Kap Atholl to verify whether all or only select family groups are affected. Finally if pasture is the cause, determining whether the geographically distinct Kap Atholl area is the only region the problem appears in could clarify the issue. Hence the possible presence of overgrown hooves in other regions should be checked.

## *Acknowledgements*

A sincere thank you to the 6 Qaanaaq hunters and 4 dogsled drivers. They achieved the Kap Atholl collection, despite storms and other obstacles. The Greenland Directorate for Environment & Nature funded and organized the collection. The Greenland Directorate for Industry provided the wildlife officers and hunter contacts. Dr. Henrik Elvang Jensen did the pathology work. Thanks to Sofie Ruth Jeremiassen and Linda Odgaard in lab work, Casper Christoffersen for scanning photos, Pipaluk Møller Lund for map figure, Bjarne Lyberth for Kangerlussuaq data, and Kirsten Nielsen, Erik Born & Arild Landa for reviewing the manuscript.

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**Appendix 1.** *Raw data for measurements of hoof[1] lengths, muskoxen, Kap Atholl, spring 1998.*

| Muskox ID | Age | Age (years) | Sex | Foreleg hooves | (cm) | Hind-leg hooves | (cm) |
|---|---|---|---|---|---|---|---|
| KPA98-1 | adult | > 4 | male | 30 | 49 | 22 | 21.5 |
| KPA98-2 | sub-adult | 1 to 2 | female | 16 | 15 | 14 | 13.5 |
| KPA98-3 | sub-adult | 1 to 2 | male | 17 | 20 | 15 | 14 |
| KPA98-4 | adult | >4 | male | 30.5 | 30.5 | 20 | 20.5 |
| KPA98-5 | adult | > 4 (13 yr) | female | 35 | 35.5 | 19.5 | 20 |
| KPA98-6 | sub-adult | 3 to 4 | male | 27 | 26 | 21 | 20.5 |
| KPA98-7 | sub-adult | 2 to 3 | female | 18.5 | 18 | 13 | 15 |
| KPA98-8 | sub-adult | 1 to 2 | female | 18 | 19 | 15 | 13.5 |
| KPA98-9 | adult | > 4 | female | 38 | 31 | 17 | 18.5 |
| KPA98-10 | sub-adult | 2 to 3 | female | 23 | 26 | 18.5 | 20 |
| KPA98-11 | yearling | < 1 | unknown | 15.5 | 15 | 12 | 12.2 |
| KPA98-12* | adult | > 4 | male | 24.5 | 25 | 25 | 28.5 |
| KPA98-13 | adult | > 4 | female | 32.5 | 35 | 30 | 31 |
| KPA98-14 | sub-adult | 1 to 2 | female | 20 | 19.5 | 17.5 | 17 |

* mandibles unavailable, therefore age and sex deduced from field report and hoof measurements.
[1] although there are two "toes" per hoof, only the maximum length for each hoof was recorded.

**Appendix 2.** *Raw data measurements of maximum mandible & diastema lengths, left buccal side, muskoxen, Kap Atholl, spring 1998.*

| Muskox ID | Age | Age (years) | Sex | Diastema (cm) | Mandible (cm) |
|---|---|---|---|---|---|
| KPA98-1 | adult | > 4 | male | 12.0 | 40.5 |
| KPA98-2 | sub-adult | 1 to 2 | female | 9.0 | 29.9 |
| KPA98-3 | sub-adult | 1 to 2 | male | 10.1 | 31.4 |
| KPA98-4 | adult | > 4 | male | 11.2 | 40.0 |
| KPA98-5 | adult | > 4 (13 yr) | female | 10.4 | 36.7 |
| KPA98-6 | sub-adult | 3 to 4 | male | 11.6 | 38.0 |
| KPA98-7 | sub-adult | 2 to 3 | female | 9.4 | 32.1 |
| KPA98-8 | sub-adult | 1 to 2 | female | 8.8 | 30.0 |
| KPA98-9 | adult | > 4 | female | 10.4 | 37.0 |
| KPA98-10 | sub-adult | 2 to 3 | female | 9.1 | Broken |
| KPA98-11 | yearling | < 1 | unknown | 7.6 | 25.5 |
| KPA98-12* | adult | > 4 | male | – | – |
| KPA98-13 | adult | > 4 | female | 10.4 | 36.0 |
| KPA98-14 | sub-adult | 1 to 2 | female | 9.1 | 30.3 |

*mandibles unavailable, therefore age and sex deduced from field report and hoof measurements.

**Appendix 3.** *Minimal tooth wear: Raw data measurements, left buccal side, muskoxen, Kap Atholl, spring 1998.*

| Muskox ID | Age | Age (years) | Sex | $I^1$ max tooth height above gums (mm) | $I^1$ max tooth crown height (mm) | $M^1$ max tooth crown height, anterior crest (mm) |
|---|---|---|---|---|---|---|
| KPA98-1 | adult | > 4 | male | 11.8 | 12.0 | 17.7 |
| KPA98-2 | sub-adult | 1 to 2 | female | 7.7 | 15.7 | 17.3 |
| KPA98-3 | sub-adult | 1 to 2 | male | 11.3 | 14.4 | 17.1 |
| KPA98-4 | adult | > 4 | male | 12.5 | 13.8 | 18.6 |
| KPA98-5 | adult | > 4 (13 yr) | female | –[1] | 10.0[1] | 21.7[2] |
| KPA98-6 | sub-adult | 3 to 4 | male | 11.4 | 13.7 | 17.4 |
| KPA98-7 | sub-adult | 2 to 3 | female | 12.5 | 13.7 | 17.8 |
| KPA98-8 | sub-adult | 1 to 2 | female | 10.3 | 15.1 | 17.9 |
| KPA98-9 | adult | > 4 | female | –[1] | 9.5[1] | 19.3[2] |
| KPA98-10 | sub-adult | 2 to 3 | female | 11.2 | 12.3 | 18.9 (right side) |
| KPA98-11 | yearling | < 1 | unknown | 6.2 | 3.9 | 14.8 |
| KPA98-12* | adult | > 4 | male | – | – | – |
| KPA98-13 | adult | > 4 | female | –[1] | 9.4[1] | 22.1[2] |
| KPA98-14 | sub-adult | 1 to 2 | female | 12.3 | 14.9 | 18.4 |

* mandibles unavailable, therefore category, age and sex deduced from field report and hoof measurements.
[1] Although tooth crown still of substantial height the enamel on tooth's buccal surface is worn away.
[2] Increased tooth crown height was the result of jawbone erosion, which revealed more of the tooth crown. Hence the oldest animals had the greatest tooth crown heights. No roots were ever visible on molars.

***Appendix 4.*** *Photos of overgrown hooves, Kap Atholl muskoxen, April 1998. Shown are a lateral view of a fore-leg hoof, followed by ventral views of foreleg and hind-leg hooves, unless otherwise indicated. (Photos C. Cuyler)*


*Muskox KPA98-1; age > 4 years.*


*Muskox KPA98-2; age 1 year 11 months.*

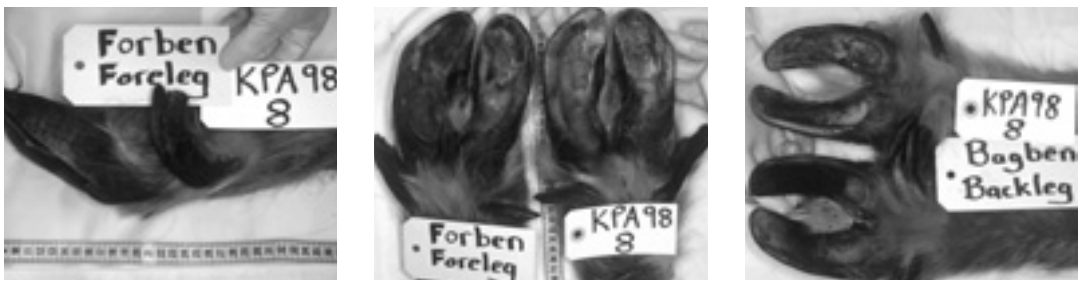

*Muskox KPA98-3; age 1 year 11 months.*


*Muskox KPA98-4; age > 4 years.*


*Muskox KPA98-5; age > 13 years.*


*Muskox KPA98-6; age > 3 years 11 months.*
*(dorsal views 2 forelegs & ventral view hind-leg hooves shown).*


*Muskox KPA98-7; age > 2 years 11 months.*



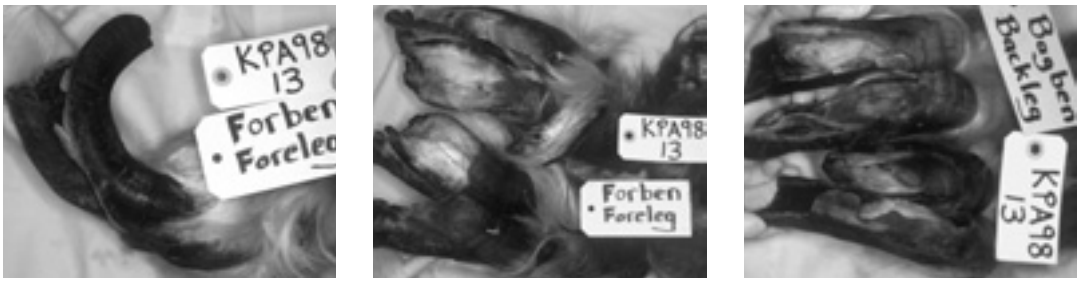

*Muskox KPA98-8; age > 1 year 11 months.*


*Muskox KPA98-9; age > 4 years.*


*Muskox KPA98-10; age 2 years 11 months.*


*Muskox KPA98-11; age > 11 months (yearling).*
*(dorsal & ventral view forelaeg, ventral view hind-leg hooves).*


*Muskox KPA98-12; age > 4 years.*
*(dorsal view forelaeg, ventral view forelegs, ventral view hind-leg hooves).*




*Muskox KPA98-13; age > 4 years.*


*Muskox KPA98-14; age 1 year 11 months.*

***Appendix 5.*** *Photos of incisor teeth, Kap Atholl muskoxen, April 1998. Note the extensive remaining tooth crown and minimal tooth wear on adults KPA98-1,-4,-5 (13yr),-9 & -13. (Photos C. Cuyler).*


*Age > 4 years.*


*1 year 11 months.*

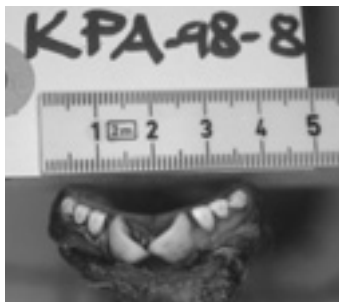

*1 year 11 months.*


*Age > 4 years.*

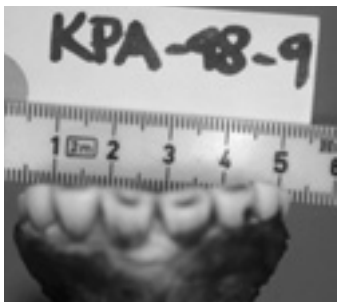

*Age > 4 years (13yr).*


*3 years 11 months.*


*2 years 11 months.*

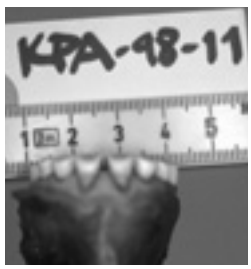



*1 year 11 months.*




*Age > 4 years.*


*2 years 11 months.*




*11 months.*


*Age > 4 years.*


*1 year 11 months.*

***Appendix 6.*** *Photos of left molar tooth row, Kap Atholl muskoxen, April 1998. Note minimal tooth wear on occlussal surfaces of adults KPA98-1,-4,-5 (13yr), -9 & -13.* *(KPA98-10 right molar tooth row illustrated as left mandible was shot.) (Photos C. Cuyler).*


*Age > 4 years.*

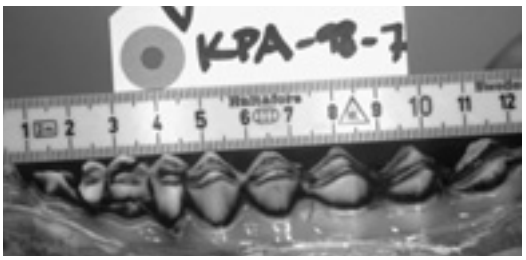

*1 year 11 months.*


*1 year 11 months.*


*Age > 4 years.*


*Age > 4 years (13yr).*


*3 years 11 months.*




*2 years 11 months.*


*1 year 11 months.*


*Age > 4 years.*


*2 years 11 months (right side).*


*11 months (yearling).*


*Age > 4 years.*


*1 year 11 months.*

**Appendix 7.** *Kap Atholl Field Journal of 1998.*

Sisimiut Kommune, Jagt og Fiskeribetjent, Sisimiut

DMN
J.NR.
BEH. ØS
29 SEP. 1998
KOPI
EXP

Sisimiut den 22.sept.1998

# Rapport om
# Moskusjagt ved Maniseqqat i Qaanaaq Kommune.

Torsdag den 02. april 1998 blev undertegnede ringet op af Øystein Slettemark,Direktoratet for Miljø og natur, der forespurgte, om jeg kunne interressere mig for moskusjagt i Avanersuaq Kommune, ja selvfølgelig, men efter påske, da jeg ikke har holdt påske med min familie de sidste 4 år. Det skulle så være i orden. Hvor Jakob Heilmann fra Maniitsoq også skulle deltage.

Senere samme dag kontatede jeg Jakob Heilmann, der oplyste, at han tidligere på dagen havde modtaget telefax fra Amalie Jessens afdeling, med oplysningen om, at Jakob skal afsted den 08. april fra Maniitsoq med videreerejse mod Pituffik den 09.april fra Kangerlussuaq, da jeg ikke har været villig til at deltage, og da Avanersuaqfangerne vil på jagt i påsken.

I den anledning rettede jeg telefonisk kontakt med Lauritz Kreutzmann, DFFEL, som kontaktede Amalie Jessen, med forklaring om , at jeg ellers altid har været meget villig til at komme med til Avanersuaq.s moskusjagt.
Og det endte med at jeg bare skulle kontakte Øystein Slettemark.

Øystein Slettemark blev kontaktet og alt blev ordnet, og han oplyser, at han for en sikkerheds skyld allerede havde bestilt billet til undertegnede.

Tirsdag den 08.april 1998 kl. 1630 afgang fra Sisimiut til Kangerlussuaq, og herunder ingen instrukser modtaget, men forventer at Øystein Slettemark vil instruere os i kangerlussuaq, da han skulle være der.
Ankommet til Kangerlussuaq blev jeg af Jakob Heilmann orienteret om, at Øystein er rejst videre til Danmark, og at 3.manden fra Nuuk ikke er ankommet, og vil derfor heller ikke nå at komme frem inden flyet mod Pituffik afgår i morgen tidlig kl. 0700. Jakob Heilmann rettede kontakt til Paviaraq Heilmann med hensyn til de hidtil passerede, men Paviaraq ønsker, at vi fortsætter mod Pituffik, da projektet allerede er startet.

Onsdag den 09.april 1998 kl. 0730 afgang fra Kangerlussuaq til Pituffik, og ankommet til Pituffik kl. 0900 (normal tid i vestkysten) med i Pituffik kl. 0800, mødte vi Amalie Jessen, der hermed blev meget overrasket over at vi kun har billet til Pituffik, da jagtens udgangspunkt er Qaanaaq, men efter hun ringede frem og tilbage, og herunder næsten besluttede, at vi skal tilbage til Kangerlussuaq med samme maskine vi ankom i, blev der senere og inden hendes afgang besluttet at vi skal blive i Pituffik indtil videre, da fangerne fra Qaanaaq kommune ellers ville først på jagt efter påsken.
Nå så langt så godt.
Vi bliv indlogeret, og i løbet af dagen, blev vi kontaktet, at fangerne fra Qaanaaq, kun

Aqqusinersuaq 8, 3911 Sisimiut.tlf.865480.fx.865168

vil på jagt hvis de fik betaling for det, men de ville Natur og miljødirektoratet ikke være med til, og derfor skulle vi prøve på at finde ud om det kunne lade sig gøre at leje en helikopter fra Grønlandsfly,
Således at kun undertegnede og Jakob Heilmann, kan tage ud og skyde de moskusokser med deforme klove.
Lejemuligheder blev undersøgt, men den næste problem er at undertegnede har ladet sin riffel ligge i Kangerlussuaq, da der skulle være så mange gode og umulige problemer, hvis man kom ind til Pituffik medbringende skydevåben - da man ville tro, at Grønland er ved at starte krig mod USA, og man ville derfor straks blive afvæbnet, da Amerikanerne endnu ikke har fundet ud at Grønlandske våben kun er til "jagtformål" og ikke til krig.
Da vi nu ikke har våben er det umuligt at tage på jagt, og låne eller lejemuligheder af rifler er det også umuligt, da faktisk den eneste, som er nærliggende til at hjælpe os med den slags, er BIOS-manden Jan Thrysø, der ellers næsten har fået tilbudt jagten, men har aldrig hørt noget igen siden idag da vi ankom.
Så - han er ikke til stor hjælp.

Hen mod aftenen den 09. april 1998 hørte vi fra Komunaldirektøren i Qaanaaq, at aftalerne endelig er på plads, og at hundeslæderne vil starte i morgen, men da butikkerne allerede nu er lukket til påsken, vil han forsøge at få butikken åbnet inden de afrejser, således de kunne købe lidt proviant,
men at turen til Pituffik vil tage 2 til 3 dage, da slædeholdet muligvis skal køre over indlandsisen, på grund af dårlige og usikre isforhold visse steder.

Den 10. april 1998, fik vi melding om at fangerne nu er kørt med deres hundeslæder, men at et par stykker af dem ikke har det så godt, da de er noget fulde, men ikke alle.

Den 11. april 1998 kl. 2015 meddeles der fra Moriusaq, at en enkelt hundeslæde fra Qaanaaq nu er nået frem, og da der i løbet af dagen har været silende regn, er alle hundeslæderne blivet meget våde, og resten af holdet skulle kunne ankomme senere på aftenen, men vil uden tvivl afvente på noget bedre vejr.

Den 12. april 1998 kl. 1700 blev der meddelt, at alle fangerne og vores slædekuske nu er ankommet til Pituffik havn, og at vi nu blot skal gøre os klar til videre afgang til jagtområdet, som skulle være MANISEQQAT.
AFGANG 12.april kl. 1745 kørsel mod NARSAARSUIT alle 8 hundeslæder i dejlig solskind og lovende godt vejr.
Ankommet til NARSAARSUIT kl. 1930, en gammel hyggelig fangstboplads, og der besluttes at vi overnatter på stedet, og først fortsætter til jagtområdet næste dags morgen.
Hytten vi skulle overnatte i ejes af Thomas "tuumarsi", som er en af vores kuske,
Kl. 2230 ankom der 2 hundeslæder fra Savissivik, således er vi fuldtallige, hvor der nu er 6 fangere og 4 kuske, og klar til næste dag.

Den 13. april 1998:
Kl. 0630, er det begyndt at blæse, og alt hvad øjet rækker syntes at være gråligt, og den ældste deltager fra Moriusaq "Iisaannguaq", der er vandt til at være i området,

oplyser, at alle lige så godt kan blive på stedet, fordi en uhyggelig kraftig storm er på vej.
Lidt senere på dagen kom stormen, og det er så kraftigt, så det nærmest må være Orkan, da vi ikke engang kan stå på benene. Hytten rystede hele tiden, så man næsten skulle tro at den vil blive blæst væk fra grunden.
Og sådan gik det til hele dagen.
Om aftenen samles vi alle i den hytte hvor jeg bor, og det skal lige bemærkes, at der er ca. 10 fangsthytter i Narsaarsuit, og de ældre fangere begyndte at fortælle fangsthistorier - "bare man kunne forstå det hele".
Samtidig fik fangerne tiden til at gå, med at foretage radioforbindelser til forskellige andre stationer i Avanersuaq-området, såsom: Qeqertat - Uunartoq - Sannerut - Grisefjord - Mitsimatalik - Qaanaaq - Moriusaq - Savissivik , og høre om vejret, og om andre nyheder, med deres specielle radioer af mærket: Radio SBX-11A - SPILBURY, på kanalerne 5031 og 5210, som syntes at være ret gode radioer, da de på et tidspunkt fik kontakt med Uno og Mathias Ingemann og Karo, som er begyndt at nærme sig Eqaliut i Canada, under deres lange hundeslædetur.

Den 14. april 1998:
Der var storm hele dagen, og i vores hytte havde vi Uusaqqaq Qujaakitsoq som sovegæst, ligesom der også var lidt flere til, der ligesom Uusaqqaq kører med hundeslæde for Amerikanske og Australske turister.
Hele natten var der ingen der sov i fred, da der stormede så kraftigt, at hele hytten rystede som om den var ved at blive blæst væk.
Om aftenen var stormen ved at lægge sig, og da vi endelig lagde os til køjs, var der næsten stille udenfor, men hele dagen havde jeg ikke set noget til Jakob Heilmann, , der bor i en anden hytte, der ligger ca. 75 meter væk fra vores.

Den 15. april 1998:
Om morgenen, ja, igen pinlig overraskelse, stormen har tiltaget igen, og det er onsdag.hvor vi skulle have fløjet hjemad fra Pituffik basen, men må nu erkende at vi må vente på næste fly, der afgår fra Thule basen den 22.april, hvis vejret kan være med os, eller hvis vi er færdige med jagten.
Og vejrmelingen lyder på storm -18 knop fra syd, men aftager sidst på dagen, og man bliver helt optimistisk igen, efter 3 dages indespærring, og provianten, som er beregnet til 3 - 4 dages jagt er allerede er ved at blive spist op.
Stormen aftager i løbet af eftenen, og om aftenen kl. 2340, er det blivet så godt vejr, at vi kunne nyde solnedgang over Appat-øen, og for lidt siden mødte jeg Jakob Heilmann, der ligesom mig, har været tæt på at opgive.
Og nu trods natten er man allerede igang med så småt at forberede til næste dags morgen, med at ordne hundeskagler og fodre hunde, da der de sidste 3 dage har været helt umulig bare at fodre hunde, og da en af fangerne miste en af sine hunde, der løsrev sig fra selerne, er vi alle igang med at indfange den, da denne var lidt sky, og fangede den først kl. 0130 den 16.april, hvorefter alle kunne falde til ro.

Den 16. april 1998:
kl.0615 stod jeg op, der var helt stille udenfor, lyd som om, at der er vindstille, mon det er nu, vi kan komme på jagt, og Qillaq Duneq stod ligeledes op, og så ligeledes

helt optimistisk ud, og begyndte med at klargøre sine kamiiker, og sagde "jeg er jo ungkarl og derfor må jeg selv sy og ordne mine kamiikerne.
Alt og alle begyndte at gøre klar til afgang, ting og sager og soveposer pakkes, og alle kørte kl. 1000, og efter flere stop og i Pingorsuit hvor man havde kikket med kikkert efter moskusokser stoppes der ved isen i Iterlaat kl. 1400, og der laves varm vand til kaffe eller the,og efter man havde fået lidt at spise kørte vi videre, for at køre op i land igen ved MANISEQQAT.
Efter en hård og vanskellig tur gennen dale og dyb sne ( der skal huskes, at Thule-fangerne har meget lange slæder, der ikke kan dreje i dyb sne, og de skal mange gange løftes for at blive drejet lidt), så vi de første moskusokser i en vestvendt skråning inde i selve Maniseqqat landet ca. kl. 1700, og efter at have orienteret os godt om landskabet begyndte vi at snige os ind mod dem.
Og da vi kom tættere på kunne vi se, at der er 10 dyr, og vi standsede op, og bad fangerne om at tage det lidt med ro, da jeg og Jakob Heilmann først må undersøre dyrene grundigt med kikkert, da vi kun må skyde dem med stærkt tilgroede klove.
MEN, alle dyrene har mere eller mindre tilgroede klove, kunne vi se, og derfor bad vi fangerne om at nedlægge alle dyrene.
og efter ca. 30-40 skud blev 10 dyr nedlagt. og slagtningen startet.
Alle dyrene er i aldersgruppe fra 1½ års og op til ca. 15 års moskussimle,der bærer på

1 stk. nr. 331, som er fastgjort på øreflippen.

og der blev taget fotos af dette, samt at blev taget fotos af alle dyrenes hoveder med deres tilhørende klove.

Efter slagtningen er afsluttet, kørte vi ned til isen igen gennem dalen, og kom til velegnet lejrplads SAVISSUAQ kl. 0100 den 17.april 1998, og telte rejses og der laves mad, og efter spisning lagde sig til ro efter en vellykket jagt.

Den 17. april 1998:
Der er igen afgang til jagtområde, og dennegang lidt sydligere, til QOORORSUAQ nordøst for Pituffik Gletzher, afgang kl. 1030.
Umiddelbart efter at vi startede kørslen gennem dalen, så vi 4 fuldvoksne tyre, oppe på toppen af fjeldet, og da jeg ville følge den lidt for at se deres reaktionen med hensyn til, om de generes af deres klove, aftalte vi, at når jeg giver tegn, slibbes der 2 hunde, som skal stoppe dyrene.
Og jeg gik i ca. 1 halv time og fulgte dyrene, og et par gange fik dem til at løbe ved klappe 2 sten sammen, men der kan ikke konstateres om de er generet af deres forvoksede klove - jeg skulle faktisk have medbragt en videokamera, så der kan ses at ikke på nogen måde er generet af deres klove. Da de løber lige så let som dyrene ved Kangerlussuaq området, og efter de 4 bliv nedlagt kan det ses, at de er lige så fede som dyrene fra dagen før.
Nogle af de nedlagte dyr er faktisk mere fede end dyrene ved Kangerlussuaq området, og kort sagt kan det siges, alle de nedlagte dyr var i flot stand, med undtagelse af klove, der godt nok ses noget mærkelige.
Området hvor moskusokserne befinder sig er et yngleområde for Søkonger, så, mon det ikke er de små fugles efterladenskaber, der er så kalkholdige, og resulterer

fortsat side 5 - moskusjagt i Avanersuaq.

dyrenes kloves hurtige vækst.
Området er meget stenfyldt og jorden er ret hård.
De sidste 4 nedlagte dyr er heholdsvis 3 dyr, 8-10 årige og den 4. ca. 15 år.
Da det er meningen at vi højst måtte skyde 15 dyr, og at vi nu har fået 14 dyr, blev alle fangerne samlet, og meddelt, at vi indstiller jagten. Alle er tilfredse med resultatet.

Der blev desvære ikke taget fotos af denne sidste fangstdags oplevelser, da jeg var sluppet op for film.

Efter slagtningen kørte vi mod teltpladsen hvor alt blev pakket og ryddet området og begyndte kørslen kl. 1730 over isen langs med kystrækningen mod NARSAARSUIT (fangstbopladsen).
Der var åbne vandhuller på isen flere steder, men vores gode og dygtige kuske klarede turen med den største bravur.
Ankommet til NARSAARSUIT kl. 2130, blev vi enige om at kunne lige godt benytte os af de gode vejr og fortsætte mod Thulebasen og ankom til stedet kl. 0030 den 18.april 1998.

den 20. april 1998:
Alle vores indsamlede klove blev pakket og sendt til Naturinstituttet, NUUK, og der var over 100 kg.

den 22. april 1998:
afgang fra Thulebasen kl. 1000 lokal tid, og ankommet til Sisimiut kl. 1430., hvor Jakob Heilmann må have ankommet noget senere til Maniiitsoq,

Der vedlægges nummereret fotos med forklaringer.

Med venlig hilsen

Hans Sv. Mølgaard
Jagt & Fiskeribetjent
Sisimiut