Sodium to mink throughout the year

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Introduction

Salt (sodium chloride) is very important for the health of the animals. If they do not get a sufficient amount of sodium (Na) they will reduce their feed consumption and loose body weight, plasma aldosterone and packed cell volume will be elevated, and urinary sodium excretion will be reduced (Yu & Morris, 1999). Consumption of too high amounts of Na likewise decrease feed consumption and body weight. Further the animals get a dark diarrhoea, rough coat, crusty nose and eyes, irritability in the early stage, and lethargy in the later stages. (Restum et al., 1995). In the nursing period we usually add sodium chloride to the feed to prevent nursing sickness (Clausen et al., 1996; Clausen et al, 2002; Hartsogh, 1960). A change in feed raw materials from animal by-products to more vegetable products, where the content of Na is often very low, has made it necessary to reconsider the Na content in mink feed throughout the year.

Materials and methods

Adult male mink

The investigation was carried out from April 11 to April 18. Four groups of 5 brown male mink were feed synthetic feed with different Na content (Table 1).

Table 1. Added NaCl and analysed Na content in the feed for adult male mink

Added, % NaCl	0	0.05	0.10	0.15
Analysed, Na g /100 kcal	0.017	0.037	0.057	0.059

Kits in early growth

Nine groups of 20 litters of black mink kits were included in the experiment from 6 to 10 weeks of age. Raw materials with a very low Na content was chosen for the experimental feed. The experimental feed was added increasing amounts of NaCl (Table 2).

Table 2. Added NaCl and analysed Na / NaCl in the feed for mink kits in early growth.

Added % NaCl	0	0.05	0.1	0.3	0.6	0.9	1.1	1.3	2.3
Analysed g Na / 100 kcal	0.028	0.042	0.052	0.105	0.193	0.269	0.341	0.396	0.732
Analysed g NaCl/100 kcal	0.07	0.11	0.13	0.27	0.49	0.68	0.86	1.00	1.85

Results and discussion

Adult male mink

There was no significant difference in bodyweight between the groups. In all groups there was a decrease in body weight during the experiment probably due to bad taste of the synthetic feed (Table 3).

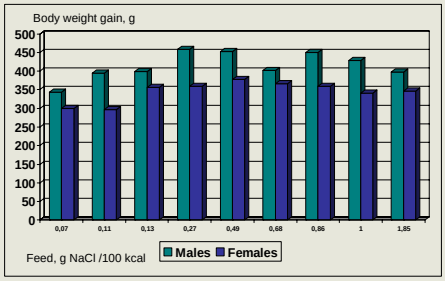
Table 3. Body weight increase and feed consumption in adult male mink feed different amounts of Na.

Consumed g Na / kg body weight / day	Body weight increase in the investigation period, g	Average daily feed consumption, g / kcal
0.019	-174 (99)	173 (54) / 197
0.0446	-147 (84)	169 (44) / 193
0.0775	-50 (50)	213 (29) / 243
0.0781	-94 (89)	199 (17) / 227
p-value	NS	NS

Kits in early growth

Kits were weaned at 6 weeks of age which can affect growth negatively, even though they were housed three together. Their body weight gain is therefore not totally reliable. Anyway there is a tendency towards the lowest weight gains in kits getting very low and very high amounts of Na (Figure 1).

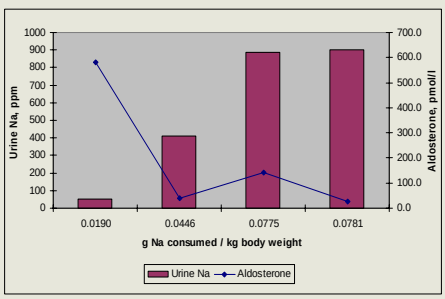
Figure 1. Body weight gain in 6 – 10 weeks old male- and female mink kits feed different amount of Na.



Adult male mink

At the end of the investigation urine samples were collected for determination of Na content and blood samples were collected for plasma aldosterone determination. The concentration of plasma aldosterone was very high and the concentration of urine Na very low in the group feed the lowest amount of Na compared to the other groups (Figure 2).

Figure 2. Urine Na content and blood aldosterone in male mink feed different amounts of Na.



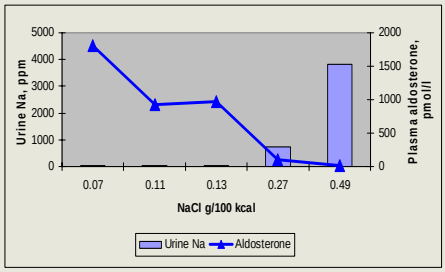
This corresponds to earlier results in mink and cats (Clausen et al, 1996, Yu & Morris, 1997; 1998; 1999). In the groups with added NaCl the urine Na was considerably higher and plasma aldosterone was within normal range.

It seems that 0.019 g Na per kg body weight per day is too little for adult male mink whereas 0.0446 g Na/ kg body weight is sufficient to fulfil the need.

Kits in early growth

At the end of the investigation urine was sampled for Na determination and blood was sampled for determination of plasma aldosterone in male mink kits from the five groups with the lowest Na (Figure 3).

Figure 3. Urine Na and blood aldosterone in male mink kits feed different amounts of Na.



The concentration of plasma aldosterone was very high and the concentration of urine Na was very low in the three groups fed the lowest Na content in the feed, indicating that the amount of Na was to low to fulfil the need of the kits. In the other two groups the concentration of urine Na was considerably higher and the concentration of plasma aldosterone was within normal range.

Conclusion

The results from these and earlier investigations (Clausen et al., 1996; Clausen et al., 2002) lead to the following recommendations on the content of NaCl in the feed throughout the year (Table 4).

Table 4. Recommended NaCl content in Danish mink feed throughout the year

Period	g Na / 100 kcal	g NaCl/100 kcal	% NaCl *
Adult mink, January	0.05	0.13	0.15
Nursing females	0.17	0.42	0.5
Growing kits 6-10 weeks	0.11	0.27	0.4
Adult mink, August – pelting	0.03	0.08	0.15

* energy concentration: 120 – 120 – 150 - 200 kcal/100g

References

Clausen, T.N., Wamberg, S., Hansen, O., 1996. Incidence of nursing sickness and biochemical observations in lactating mink with and without dietary salt supplementation. Can. J. Vet. Res., 60, 271-276.

Clausen, T.N., Sandbøl, P. & Damgaard, B.M., 2002. Salt i dieperioden samt den tidlige
vækstfase. Faglig Årsberetning 2001, 91-96, Pelsdyrerhvervets Forsøgs- og Rådgivningsvirksomhed.

Hartsogh, G.H., 1960. Nursing sickness basically a salt depletion. National Fur News, 32, 10 + 44

Restum, J.C., Bush, C.R., Malinczak, R.L., Watson, G.L., Braselton, W.E., Bursian, S.J., Aulerich, R.J., 1995. Effects of supplemental dietary sodium chloride and restricted drinking water on mink. Vet. Human Toxicol., 37, 4 - 10.

Yu, S., Morris, J.G., 1999, Sodium reguirement of adult cats for maintenance based on plasma aldosterone concentration. J. Nutr., 419 - 423.