

Birdshooting, Lead Pellets, and Grazing Cattle

H. Bjørn, N. Gyrd-Hansen, and Inge Kraul

*Department of Pharmacology and Toxicology, Royal Veterinary and
Agricultural University, Copenhagen, Denmark*

In recent investigations trapshooting using lead pellets on agricultural land has been shown to result in large numbers of pellets being deposited in the reticulum of cattle grazing the area or being fed plant material harvested on it (CLAUSEN et al. 1981). Large numbers of lead pellets in the reticulum might lead to increased lead concentrations in blood and tissues of the animal. When such lead contents go beyond the maximum accepted levels the animal is no longer considered suitable for human consumption and will consequently be condemned.

Trapshooting is however practiced in a limited number of restricted areas only, while birdshooting and other types of shotgun hunting are taking place on almost all agricultural land. The purpose of the present investigation has been to study the effect of heavy birdshooting on the lead level in blood of cattle grazing the same pastures on which the shooting takes place.

MATERIALS AND METHODS

On a large meadow area, called Værneengene, in the western part of Jutland a total of approximately 1100 two-years heifers are grazing every year from May until the end of October. The animals are only grazing the area for one season. The water level in the area differs from year to year depending on whether the summer is wet or dry. In 1980 the summer was wet and parts of the area was under water, while in 1981 the area was dry and the grass was very much grazed down. There are no roads in the vicinity of Værneengene. The pasture is bordering on a bird sanctuary called Tipperne and has a very high population of ducks and wading-birds. During the season starting in August birdshooting in these meadows is probably more intense than anywhere else in Denmark.

Shortly after housing the heifers at the end of October 100 mL blood samples were collected from randomly selected animals. A total of 19 and 24 samples were taken in 1980 and 1981, respectively.

On another permanent pasture in an area of Jutland called Store Vildmose a similar herd of two-years heifers is grazing every year until the end of October. A lightly trafficked road runs through the area where all hunting and shooting has been banned for many years. Blood samples taken from 28 randomly selected heifers in this herd in October 1980 have served as controls.

The analytical procedure used is a simplified version of a method developed by HESSEL in 1968. The principle in the method is to treat whole blood with a mixture of Triton-X-100® (5 %) and ammoniumpyrrolidine-dithiocarbamate (APDC, 2 %) in order to haemolyse the blood and chelate the lead. The chelated lead is extracted by methyl-iso-butylketone (MIBK) and determined by flame atomic absorption spectrophotometry (Perkin-Elmer 303). Limit of detection: 0.025 µg Pb/mL blood.

RESULTS

All the lead contents found are below or around the limit of detection and should therefore be looked upon with some reservation. The results are summarized in table 1.

TABLE 1. Blood lead levels in cattle grazing on two different localities (Jutland 1980-81).

Locality	year	n	samples above 0.025 µg/mL	max. µg/mL
Værneengene	1980	19	0	-
Værneengene	1981	24	2	0.028
St. Vildmose (Reference area)	1980	28	1	0.025

The table shows that all samples contained very low levels of lead and that this level was not influenced by birdshooting, or by the water level of the pasture.

DISCUSSION

In blood samples from 92 normal bovines in Iowa BUCK et al. (1976) found an average lead concentration of 0.103 ± 0.044 µg/mL with corresponding levels in liver and kidney of 1.12 ± 1.36 and 1.21 ± 1.69 µg/g respectively. The lead levels found in the blood samples in the present study are thus much lower than those of BUCK et al. A possible explanation for this discrepancy is that

the heifers were kept in areas with very little traffic and with no industry at all. Furthermore cattle in Denmark seems in general to contain little lead as demonstrated by an analysis of 150 bovine kidneys collected in Jutland (ANDERSEN & ENGBERG 1977). This investigation showed an average lead concentration of 0.22 µg/g kidney, or less than one fifth of the value found by BUCK et al.

In a study of the lead concentration in human blood including 247 Danes (NYGAARD et al. 1977) average values between 0.04 and 0.16 µg/mL were found, and it was concluded that Denmark seems to be a low level lead area.

No difference in lead blood levels could be demonstrated between heifers in the birdshooting pasture and the control heifers, not even during the dry summer of 1981 when there was little grass which should facilitate the uptake of lead pellets deposited on the ground. On basis of the blood values found even the most intensive birdshooting seems without effect on the lead level in cattle grazing the area.

Recently the question has been raised whether blood lead is a good indicator of tissue lead, or whether there could be increased lead levels in organs of animals with normal blood values (KELLER & DOHERTY 1980, SCHLICK et al. 1980). This problem remains to be solved but it should be mentioned that CLAUSEN et al. (1981) has shown that cattle containing up to 100 pellets in the reticulum still has normal lead contents in liver and kidney thereby supporting the conclusion that birdshooting using lead pellets apparently constitutes no threat neither to the cattle nor to the consumer.

REFERENCES

- ANDERSEN: A. & Å. ENGBERG: National Food Inst. 36, 14 (1977).
- BUCK, W.B., D. OSWEILER & G.A. VAN GELDER: Clinical and diagnostic veterinary toxicology. Iowa, Kendall/Hunt Publ.Comp. 1976.
- CLAUSEN, B., K. HAARBO & C. WOLSTRUP: Nord.Vet.-Med. 33, 65 (1981).
- HESSEL, D.W.A.: A.A. Newsletter 5, 55 (1968).
- KELLER, C.A. & R.A. DOHERTY: Toxicol.appl.pharmacol. 52, 285 (1980).
- NYGAARD, S.-P., J. OTTOSEN & J.C. HANSEN: Danish Med. Bull. 24, 49 (1977).
- SCHLICK, E., M.A. KAMRAN & K.D. FRIEDBERG: Arch.Toxicol. 46, 221 (1980).

Accepted June 7, 1982