

Investigation of Lead Contamination in Hunter-Harvested Venison Donated to Food Charities in Minnesota

Minnesota Department of Agriculture

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Summary

The State of Minnesota initiated an investigation of venison donated to Minnesota food charities in response to reports of lead contamination of donated venison in North Dakota. Subsequent laboratory analysis by the Minnesota Department of Agriculture (MDA) confirmed the presence and quantified the amount of lead in donated venison samples. Lead quantity per sample varied considerably with some samples exceeding 100ppm. Ground product had a higher rate of metal contamination (26%) when compared to not ground product (2%). Contamination rates for product collected from individual processors varied by processor and processor type, with rates ranging from 0% to 77%. Additional laboratory testing is underway to further quantify the amount of lead present in contaminated samples. The data will be shared with partner agencies including the Minnesota Department of Health (MDH) and the Minnesota Department of Natural Resources (DNR) in order to generate recommendations for the venison donation program in Minnesota.

Background

Minnesota's Venison Donation Program

MDA and DNR developed a voluntary program for donating and processing of hunter-harvested deer in 2004. The 2007 legislature appropriated funds to reimburse meat processors for the processing of the donated deer. The purpose of the program is to provide access to a high-quality protein food source to needy families while assisting the State in managing deer populations.

Minnesota's venison donation program specifies that any establishment with a food handler's license may register for the program. This encompasses three general types of processors:

- USDA/State Official establishments,
- Custom meat processors, and
- Retail meat processors.

Facility requirements as well as inspection frequency and focus for non-venison meat handling differ by type of meat processor. USDA/State Official establishments have a USDA or MDA inspector on site each day that the facility is in operation. Inspectors focus on both the facilities and the carcass processing procedures.

MDA inspects custom processing facilities quarterly. Inspectors focus primarily on the cleanliness and sanitation of the facility. Meat processed at these types of establishments cannot be sold. Retail meat processors are inspected annually by MDA. Actual requirements vary according processor type as well. However, for all processors, processing of hunter-harvested venison is not routinely inspected due to its classification as "wild game" under Federal and State food laws.

2007 Deer Season Hunter Harvested Venison Program Summary

Hunters donated 1,996 deer, for a total of 78,500 pounds of venison. Seventy-two processors registered for the donation program; 70 accepted at least one deer carcass donation with an average of 27.4 deer per processor. The donated venison product was distributed to approximately 70 Minnesota food banks and food shelves. Program statistics are summarized on Table 1. Table 2 lists all registered processors, while Table 3 describes the percentage of registered participants by processor type.

Events Triggering Recall of Donated Venison

In response to reports from North Dakota of lead contamination of donated venison, MDA officials initiated an investigation in March 2008. A private North Dakota physician had reported finding radiographic evidence of metal in 60 of 100 samples (60%) of donated venison collected from North Dakota food shelves. The State of North Dakota confirmed the presence of lead in these samples.

Due to the similarities in venison donation programs in Minnesota and North Dakota, a decision was made to place any venison remaining at food charities on hold until additional testing could be conducted to evaluate the presence and distribution of lead in product donated in Minnesota. All food charities that had accepted donated venison through the state-funded venison donation program were notified of the product hold and MDA collected a subset of product from Duluth, Rochester and Bemidji areas for the initial investigation.

The purpose of this initial investigation was to determine if donated venison in Minnesota was contaminated with lead and if so, to establish a preliminary estimate of the level of contamination. Samples for the initial analysis were collected from the Duluth, Rochester and Bemidji areas. All 238 samples were examined by radiography to determine the presence of metal. Because the MDA laboratory does not have the equipment required to conduct these radiography tests, the work was conducted by Atlas Inspection Inc., of Minneapolis. Radiographic evidence of metal was found in 32% of samples. The percent of samples with metal evidence varied by individual processor, ranging from 0% to 77%.

The MDA laboratory analyzed a subset of samples using ICP-MS (Inductively Coupled Plasma –Mass Spectrometry) to confirm the presence of lead. An alkaline tissue digestion was performed to isolate the metal fragments and to quantify the amount of lead present in these samples. This analysis confirmed the presence of lead. Lead concentration in the samples varied, with some samples exceeding 100 parts per million (PPM). Based upon the initial results, the remaining venison was considered adulterated and was ordered to be destroyed. Food shelves were contacted and visited by MDA staff to ensure that all venison was properly discarded.

Recall Data

At the time of the initial investigation, more than 16,000 pounds of product remained at 37 food charities. Food charities were contacted prior to destruction of the product in order to collect additional samples. .

Expanded Investigation

Purpose: The purpose of the expanded investigation was to determine any potential risk factors associated with lead contamination of venison such as type of processor, geographic location, hunting zone or other factors.

Methods: MDA collected samples from every participating processor in the state that had product remaining at a food charity. Sampling was also targeted at collecting both types of product allowed to be donated in the program: Ground (plain ground venison only) and Not Ground (steaks, roasts, chops). Basic statistical analysis was performed using Microsoft Excel, while statistical significance was calculated using logistic regression to consider multiple factors (Epi Info).

All samples were radiographically analyzed to detect evidence of metal particles greater than 0.8mm. Tissue analysis to confirm presence and quantity of lead has been performed on a limited number of samples. Additional tissue testing is currently being conducted to gather more information on the range of lead concentrations present in the venison products sampled

Results

A total of 1,239 samples were collected from 39 different processors (55% of registered processors). Processors were located in most of the geographical areas of Minnesota (Figure 2).

Radiographic evidence of lead was compared for Ground and Not Ground product, type of processing establishment and hunting zone.

Product Type Ground product had a much higher rate of metal contamination (26%) than did Not Ground Product (2%) (Table 4). Not Ground product types were similar across processor types.

Processor Type For ground product, USDA/State official establishments had the smallest percentage of positive samples (14%), while custom plants (27%) fell in the middle, and retail meat processors had the highest percentage of positive results (37%) . These results are shown in Table 5.

Individual Processor Results Radiographic evidence of metal in ground product was analyzed by individual processor. While a few processors had no contamination identified in their product; 87% of processors (34 of 39) had at least some metal contamination identified in their processed product (Table 6). Figure 1 provides a

graphical representation of the distribution of individual processor results. Processors represented most of the geographical areas of Minnesota (Figure 2). Tables 7 and 8 list individual processor sample results by processor for ground and not ground product, respectively.

Hunting Zone In Minnesota, hunters are required to use certain types of ammunition in certain geographical areas. (Figure 2). For this analysis, processor location was used as a proxy estimate of hunting zone from which the deer were harvested. Radiographic evidence of metal was found in 29% of samples collected from the rifle hunting zones and in 19% for shotgun zones. This difference was not statistically significant when other factors were considered. Processor type had a stronger influence on whether or not product would be contaminated.

Tissue Testing Results MDA performed follow-up tissue testing on a select number of samples. The goal was to confirm that the metal detected by radiography tests was lead and to quantify the amount of lead in the sample. This additional testing has not yet been completed, but is intended to gather additional data regarding the range of lead present in positive samples and samples for which lead was not detected by X-ray. The amount of lead in each sample was quantified by MDA laboratory tests in which the venison tissue around the lead was digested, and the remaining lead was measured. The presence of lead in specific samples was determined using chromatography. Table 9 details the tissue testing results to date.

Tables and Figures

Table 1. 2007 Venison Donation Program Summary Information

Number of deer donated:	1996
Number of registered processors:	72
Number of processors that accepted donations:	70
Average number of deer processed/processor:	28.5
Approximate pounds of venison donated:	78,500

Table 2. List of Processors Registered for Minnesota's Venison Donation Program

Establishment Name	City	State	County
Al and Terry's Proc.	Fertile	MN	Polk
Arlington Market	Arlington	MN	Sibley
Backus Locker LLC	Backus	MN	Cass
Bemidji Locker and Fish	Bemidji	MN	Beltrami
Big Steer Meats	St. Paul	MN	Ramsey
Bonngard's Family Meats	Cottage Grove	MN	Washington
Brother's Meat and Seafood	Maple Grove	MN	Hennepin
BuckRidge Meats	Millville	MN	Wabasha
Burt's Meat and Poultry LLC	Eyota	MN	Olmsted
Business Name	City	State	County
Butchers Blend	Perham	MN	Ottertail
Center Cut Meats LLC	Rogers	MN	Hennepin
Chisago Meats Inc	Chisago City	MN	Chisago
Circle Pine Sausage Haus	Circle Pines	MN	Anoka
Corvuso Meat Processing	Cosmos	MN	Meeker
Custom Cuts Processing Inc	Greenbush	MN	Roseau
D & T's Meat Market	Pipestone	MN	Pipestone
Dehmer's Meats Inc	St. Michael	MN	Wright
Double K Meat Market	Cologne	MN	Carver
Edel's Meat Market	Montgomery	MN	Le Sueur
Ely Northland Market	Ely	MN	St. Louis
Erdman's County Market	Kasson	MN	Dodge
French Lake Butcher Shop	South Haven	MN	Wright
Gamache & Sons	Esko	MN	Carlton
Garber's Meats Inc	Lester Prairie	MN	McLeod
Garfield Processing	Garfield	MN	Douglas
Grundhofer's Old-Fashion Meats	Hugo	MN	Washington
H & S Meat Processing	Shevlin	MN	Clearwater
Hancock Quality Meats	Hancock	MN	Stevens
Hoffman's Meat Market	Detroit Lakes	MN	Becker
Huettl's Locker Dressing Plant	Lake City	MN	Goodhue
Johnson's Market	Flom	MN	Norman
K & R Custom Meats	Isle	MN	Kanabec
K&N Meats Inc dba Klinder Processing	Carlos	MN	Douglas

Karsnia Meat Processing	International Falls	MN	Koochiching
Kocian's Family Market	Big Fork	MN	Itasca
Koplin's Village Market	Red Wing	MN	Goodhue
Kunnari Country Meats	Eveleth	MN	St. Louis
Lake Country Foods	Emily	MN	Crow Wing
Lakes Meat Market, Inc	Hillman	MN	Morrison
Lakes Processing	Detroit Lakes	MN	Becker
Leave it to Cleaver	Grand Rapids	MN	Itasca
Ledebuhr Meat Processing Inc	Winona	MN	Winona
Litscher's Meat Processing	Rushford	MN	Fillmore
Main Street Meats	Park Rapids	MN	Hubbard
McDonald's Meats Inc	Clear Lake	MN	Sherburne
Meat on Mille Lacs	Onamia	MN	Mille Lacs
Mills Locker Plant	New York Mills	MN	Ottertail
Miltona Custom Meats & Sausage	Miltona	MN	Douglas
Moffatt Custom Meat Processing	Hinckley	MN	Pine
Nicks Meats and Grocery	Hayward	MN	Freeborn
Oklee Locker	Oklee	MN	Red Lake
Olson Locker Inc	Fairmont	MN	Martin
Pete's Meats and Processing	Lewiston	MN	Winona
Premier Meats & Seafood, Inc.	Fergus Falls	MN	Ottertail
R Four Meats	Chatfield	MN	Fillmore
Rother Meat Processing	Hastings	MN	Dakota
S & S Custom Meats	Raymond	MN	Kandiyohi
Schroeder Meats LLC	New Germany	MN	Carver
Shepersky Meats	Menahga	MN	Wadena
Stan's West Side Spur (S S Meats)	Grand Rapids	MN	Itasca
Starbuck Meats and Locker Service Inc	Starbuck	MN	Pope
T & R Meat Processing LLC	Clearwater	MN	Wright
Taylor Meats	Watertown	MN	Carver
The Bear's Den	Saginaw	MN	St. Louis
Town and Country Meats	Newfolden	MN	Marshall
Truman Old Home Sausage House	Truman	MN	Martin
Von Hanson's Meats	Coon Rapids	MN	Anoka
Von Hanson's Meats	Eagan	MN	Dakota
Von Hansons Meats of Baxter	Baxter	MN	Crow Wing

Table 3. Categorization of Registered Processors by Processor Type

	Total Number Registered	Percent of Registrants
USDA/State Official Plants	22	31%
Custom Establishments	37	51%
Retail Meat Processors	13	18%
Totals	72	

Table 4. Sample Type Analysis

Sample Type	X-Ray Results			
	Number Not Detected	Number Positive	Total Number	Percent Positive
Ground	765	265	1030	26%*
Not Ground	205	4	209	2%*
Total	970	269	1239	22%

*This difference is statistically significant at $p < .005$ ($p = .000$)

Table 5. Sample Analysis by Processor Type

Sample Type	Processor Type	Number of Processors Sampled	X-Ray Result			
			Number Not Detected	Number Positive	Total Number	Percent Positive
Ground	1 (USDA/State)	8	156	25	181	14% ^{a,b}
	2 (Custom)	26	546	203	749	27% ^a
	3 (Retail)	5	63	37	100	37% ^b
Total Ground		40	765	265	1030	26%
Not Ground	1 (USDA/State)	6	37	0	37	0%
	2 (Custom)	8	139	3	142	2%
	3 (Retail)	3	29	1	30	3%
Total Not Ground		17	206	4	209	2%

^a This difference is statistically significant at $p < .05$ ($p = .011$)

^b This difference is statistically significant at $p < .005$ ($p = .001$)

Table 6. Distribution of Individual Processor Results for Ground Product

Ground Product Distribution Statistics	
Number of processors sampled	39
Number with metal positive product	34
Percent with positive product	87%
Minimum percent positive	0%
Maximum percent positive	77%
Range	77%
Median	17%
Standard Deviation	22.5%

Table 7. Individual Processor Results for Ground Product

Processor Name	Not Detected	Positive	Total	Percent Positive
BuckRidge Meats	10	0	10	0%
Chisago Meats Inc	20	0	20	0%
Hoffman's Meat Market	15	0	15	0%
Leave it to Cleaver	1	0	1	0%
R Four Meats	11	0	11	0%
Brothers Meat and Seafood	19	1	20	5%
Dehmer's Meats Inc	19	1	20	5%
Pete's Meats and Processing	30	2	32	6%
Nicks Meats and Grocery	28	2	30	7%
Bemidji Locker and Fish	108	8	116	7%
Burt's Meat and Poultry LLC	17	2	19	11%
Lakes Meat Market, Inc	16	2	18	11%
Johnson's Market	15	2	17	12%
Ledebuhr Meat Processing Inc	22	3	25	12%
Corvuso Meat Processing	20	3	23	13%
Double K Meat Market	26	4	30	13%
Litscher's Meat Processing	13	2	15	13%
Shepersky Meats	52	8	60	13%
Oklee Locker	27	5	32	16%
Moffatt Custom Meat Processing	10	2	12	17%
Olson Locker Inc	25	5	30	17%
Huettl's Locker Dressing Plant	12	3	15	20%
Sportsman's Paradise	16	4	20	20%
Al and Terry's Proc.	23	7	30	23%
Grundhofer's Old-Fashion Meats	16	5	21	24%
North Country Meats	22	8	30	27%
Backus Locker LLC	28	11	39	28%
Taylor Meats	20	10	30	33%
Erdman's County Market	13	7	20	35%
Main Street Meats	18	12	30	40%
Starbuck Meats and Locker Service	17	13	30	43%
Lake Country Foods	7	6	13	46%
Meat on Mille Lacs	10	10	20	50%
Garber's Meats Inc	14	16	30	53%
Town and Country Meats	11	19	30	63%
Gamache & Sons	16	30	46	65%
The Bear's Den	3	7	10	70%
Lakes Processing	4	11	15	73%
Kunnari Country Meats	10	34	44	77%
Ground Totals	764	265	1029	26%

Table 8. Individual Processor Results for Not Ground Product

Processor Name	Not Detected	Positive	Total	Percent Positive
Bemidji Locker and Fish	50	0	50	0%
Burts Meat and Poultry LLC	9	0	9	0%
Chisago Meats Inc	10	0	10	0%
Erdmans County Market	10	0	10	0%
Gamache & Sons	10	0	10	0%
Huettl's Locker Dressing Plant	3	0	3	0%
Lake Country Foods	17	0	17	0%
Lakes Meat Market, Inc	18	0	18	0%
Ledebuhr Meat Processing Inc	1	0	1	0%
Litscher's Meat Processing	10	0	10	0%
Meat on Mille Lacs	10	0	10	0%
R Four Meats	14	0	14	0%
Backus Locker LLC	19	1	20	5%
Brothers Meat and Seafood	9	1	10	10%
Dehmer's Meats Inc	9	1	10	10%
Corvuso Meat Processing	6	1	7	14%
Not Ground Totals	205	4	209	2%

Table 9. Tissue Testing Results

Product Description	X-Ray result	Fragment Analysis					Tissue Analysis*		
		Approx. # of Fragments	Max. Size of Fragments found (mm)	Min. Size of Fragments found (mm)	Lead (mg) / Weight Analyzed (g)	ppm	Biopsy #1 Lead (ppm)	Biopsy #2 Lead (ppm)	Biopsy #3 Lead (ppm)
Ground	Not Detected	1	0.25 x 0.09	---	12.4 mg / 726.4 g	17.1	ND		
Not Ground	Not Detected	0	---	---	3.7 mg / 251.1 g	14.7	ND	0.03	ND
Ground	Positive	at least 7	1.0 x 0.9	0.3 x 0.2	0.316mg / 462g	0.8	ND		
Ground	Positive	at least 4	0.5 x 0.4	0.2 x 0.2	.217mg / 487.9g	0.0	ND		
Ground	Positive	At least 2	2.9 x 1.3	0.4 x 0.3	Positive for Lead		ND		
Ground	Positive	at least 3	3.0x1.0x1.0	0.4 x 0.1	46.3mg / 412.7g	112.2	ND		
Ground	Positive	at least 22	2.8 x 1.6	0.2 x 0.2	17.6mg / 547.8g	32.1	ND		
Ground	Positive	numerous	3.3 x 2.5	0.2 x 0.1	30.1mg / 169g	178.1	ND		
Ground	Not Detected	at least 3	1.0 x 0.4	0.2 x 0.2	0.185mg / 423.9g	0.4	ND		
Ground	Not Detected	at least 3	0.3 x 0.2	0.2 x 0.1	2.079mg / 484.4g	4.3	ND		
Ground	Not Detected	8	0.8 x 0.5	0.2 x 0.1	74.5 mg / 447.3 g	166.6	0.01	ND	ND
Ground		1	0.3 x 0.3	---	47.6 mg / 484.8 g	98.2	ND	0.10	ND
Ground	Not Detected	1	0.2 x 0.1	---	1.9 mg / 481.2 g	3.9	ND		
Not Ground	Positive	> 25	10.2 x 7.9 x 7.0	0.2 x 0.1	982 mg / 401.1 g	2448.3	ND		
Not Ground	Not Detected	3	0.24 mm sphere	0.2 x 0.1	3.77 mg / 616.8 g	6.1	ND		
Ground	Not Detected	3	0.3 x 0.2	0.1 x 0.1	3.6 mg / 450.1 g	8.0	0.03	ND	ND
Not Ground	Not Detected	1	0.3 x 0.1	----	0.9 mg / 423.2 g	2.1	ND		
Not Ground	Not Detected	4	0.5 x 0.3	0.2 x 0.1	43.1 mg / 637.3 g	67.6	ND		

Figure 1. Distribution of Individual Processor Results for Ground Product

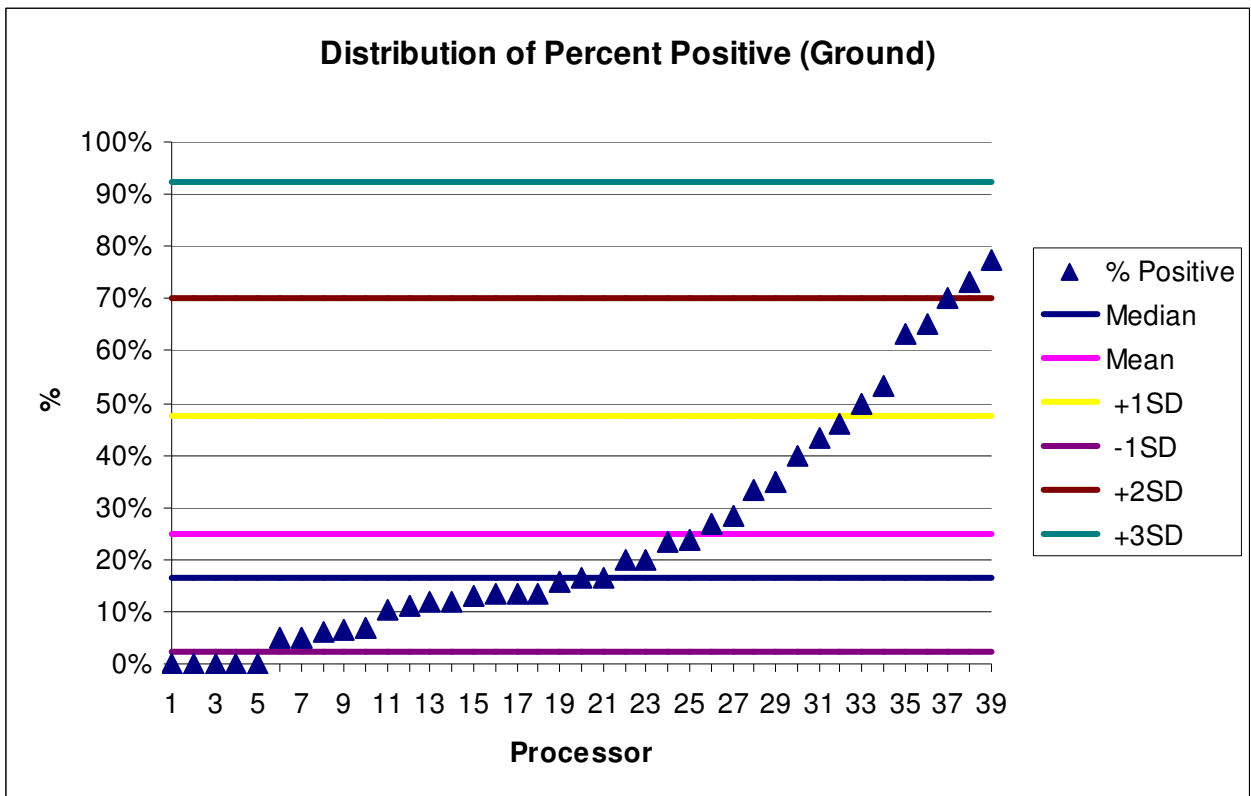


Figure 2. Map of Sampled Processor Location and Hunting Zones

