Glenda Wiles

From:	bjhoy@localnet.com
Sent:	Saturday, February 3, 2018 1:10 PM
To:	Ravalli County Commissioners Office
Subject:	Updated data on birth defects in wild ruminants
Attachments:	2011-2017 WTD Fawn Data2.xlsx; Response to Max Baucus by EPA.pdf; Bart O'Gara's Letter.pdf

Dear Ravalli County Commissioners and Ravalli County Board of Health,

This is regarding the data and measurements I have collected on Ravalli County white-tailed deer fawns from 2011 to present (see attached data sheet). I didn't get many 2017 fawns examined, so basically it is a comparison between the three years from 2011 through 2013 and the three years from 2014 through 2016. There was a huge difference in the sex ratios between the two periods and in the underbite prevalence. For data prior to 2011 see our 2015 peer reviewed published study which I sent to you.

The increase in female fawns and more females surviving to reproductive age beginning in 2014 has produced a visible increase in white-tailed deer the last two years. The female fawns born in 2014 and 2015 were old enough to produce fawns of their own in 2016 and 2017 leading to the increase in the deer population reported by MDFWP. The same is true of the elk population, with an observable increase in the elk populations as reported by MDFWP. There are still wolves in Montana, thus it would appear that the sex ratio highly skewed in favor of males and the serious birth defects (and the mortality they caused) that began in spring of 1995 (prior to any wolves being released) was always the true cause of the population declines in deer and elk and not the wolves (before or after their release) as my colleagues and I have stated many times. The data and many studies support this.

Even the MDFWP?s own data supports this, while at the same time the MDFWP personnel in Helena keep denying the big game animals have any birth defects. They call them normal variations, but they are the only ones who consider underbite and malformed male genitalia ?normal.? I am attaching the 2012 emails and other correspondence between Senator Max Baucus and the head of the Denver Office of the EPA concerning what someone in the MDFWP in Helena told the Director of the Region 6 Office, Mr. James Martin concerning Senator Baucus? request for the EPA to look into the birth defects on the mammals (including human newborns), birds and amphibians in Montana. The only thing the MDFWP addressed was the white-tailed deer and not one of the other species, including children, but still nothing was done. They told Mr. Martin that there was no decline in the white-tailed deer population (which at that time wasn't exactly true, since the WTD population didn't begin having a significant increase until after 2014). The big question is, what did the white-tailed deer population have to do with the significant increase in birth defects on human newborns or on birds and amphibians or on all the

other ungulate species which Senator Baucus sent information for and photos of to the EPA.

The good news is underbite on both sexes went down significantly in the second time period to 40% from the 72% it was in 2013. This is still 8 times what is supposed to raise a red flag concerning a serious birth defect on an ungulate according to biology books. All websites that address underbite on domestic grazing animals say an underbite is a serious birth defect because it affects the animal?s ability to get adequate nutrition.

My husband, Bob Hoy, a biologist with a degree in Wildlife Conservation from the University of Montana, has been observing that some of the male fawns born here at our place don't have antler buds until they are a full year old. Because of the short genitalia, it is impossible to tell some of the male fawns from a female fawn at about 5-6 months of age as used to be possible by their antler buds. Hunters have noted the extremely short, almost not visible antlers on males that are 1 1/2 year olds during hunting season and that such males are sometimes shot because they are thought to be does.

The sex ratio that was suddenly severely skewed in favor of females and the consequent lack of male fawns in the second period from 2014 through 2017 is concerning because in just a few years, this will affect a lot of businesses that clean heads, mount trophy animals, and guide out of state hunters. Not many trophy hunters will come to Montana to kill a doe white-tailed deer. There are plenty of does in other states. Also, the disrupted antler development should also be a matter of great concern for the above reasons.

I also think the increase in the elk herds, as well as the white-tailed deer population in Montana, are because of the significant increase in surviving female young beginning in 2014, which are now having young of their own. Those young also appear to have a sex ratio highly skewed in favor of females. In the large elk herds of from 75 to 100 animals in fields in the Bitterroot Valley, only a couple of the elk were yearling spikes, but there appeared to be quite a few yearling females. Maybe the yearling males went somewhere else, but in the late 1990s, when our data showed the sex ratio to be skewed 60/40 in favor of males, there were a lot of yearling spikes in the elk herds and the elk population went down. Males don't have babies, that should be obvious to everyone.

As you can see by the data, many of the male fawns have a very short scrotum and/or a misaligned scrotum and very short penis sheath, with 80% being born with a malformed scrotum and 20% born with a normal scrotum in the four years from 2014 to present. Some male fawns began being born with these reproductive malformations in 1995 and many have been born with this condition each year since, which we have reported in our studies. However, the reproductive malformations appeared to get better after 2001 until 2014 when they appear to be getting worse again with more having no scrotum formed during fetal development. That is considered to be a severe birth defect on mammals by both veterinarians and medical doctors. I am attaching a letter that the renowned biologist

Dr. Bart O'Gara wrote concerning WTD fetuses I showed to him prior to sending them to the MDFWP Laboratory. The MDFWP and Ag Laboratories report stated that none of the fetuses had a birth defect, even though I sent them Dr. O'Gara's letter. A 5 year old child could see the birth defects on the fetuses, so it is unclear why the lab personnel couldn't.

It is far past time to address this and find what is causing these birth defects, skewed sex ratios and other health issues. Thank you for your concern.

Sincerely,
Judy Hoy

DATA ON RAVALLI COUNTY WHITE-TAILED DEER FAWNS FOR 2011-2017

Year	Sex	Bite	Sc.	Length	Testes Len	Configuratio	Testes Pos.	PS Len.
2011	F	-2						
2011	F	-2.5						
2011	F	-1						
2011	F	-2.5						
2011	M	BS 4		3.9	5.9	LfwR	In Scrotum	1.9
2011	M	-2		0.6	3.9	LfwR	Both Ectopic	1.8
2011	M	-2		2.2	4.5	LfwR	Partly Ectopi	1.7
2011	M	-2		5.3	4.7	Bilateral	In Scrotum	4.8
2011	M	BS 2	NAM					
2011	M	BS 3	NAM					
2011	M	BS 3	NAM					
2011	M	BS 2		3.1	5.2	LfwR	In Scrotum	3.6
2011	M	BS 1		4.5	6.3	Bilateral	Tipped Horiz	2.8
2011	M	-1.5	NAM					
2011	M	NAM		5.6	5.9	Bilateral	Tipped Horiz	3.6
2011	M	-1.5	NAM					
2011	M	-3	NAM					
2012	F	BS 4						
2012	F	BS 3						
2012	F	BS 3						
2012	F	BS 3						
2012	F	BS 2						
2012	F	BS 3						
2012	F	BS 2						
2012	F	BS 2						
2012	F	-2						
2012	F	BS 3.5						
2012	F	BS 4						
2012	M	BS 3		1.7	2.6	Bilateral	In Scrotum	1.4
2012	M	BS 3		0		Not formed	Both Ectopic	1.3
2012	M	BS 2	NAM			Bilateral		
2012	M	BS 3	NAM			Bilateral		
2012	M	-2	NAM			NAM		
2012	M	BS 3	NAM			NAM		
2012	M	-2		5.3	5.9	Bilateral	In Scrotum	2.3
2012	M	-2		4.9	4.8	Bilateral	In Scrotum	3.9
2012	M	BS 2		1.3	4.7	Bilateral	Both Ectopic	1.9
2012	M	BS 5				NAM		
2012	M	BS 0		1.5	4.9	Bilateral	Both Ectopic	1.8
2013	F	BS 3						
2013	F	BS 2.5						
2013	F	BS 3						
2013	F	BS 3						
2013	F	BS 2						
2013	F	BS 2.5						
2013	F	BS 1.5						

DATA ON RAVALLI COUNTY WHITE-TAILED DEER FAWNS FOR 2011-2017

Year	Sex	Bite	Sc. Length	Testes Len	Configuratio	Testes Pos.	PS Len.
2013	F	BS 1.5					
2013	F	BS 4					
2013	F	BS 2					
2013	M	BS 3	NAM		LfwR		
2013	M	BS 3	1.1	2.3	Bilateral	Both Part Ec	0.8
2013	M	BS 2	1.3	4.7	LfwR	Ectopic	1.6
2013	M	-2	2.1	4.7	LfwR	Ectopic	2.3
2013	M	-2	2.7	4.5	LfwR	Both Part Ec	4.5
2013	M	BS 4	NAM				
2013	M	BS 3	1.2	3.7	No R Hem.	Both Ectopic	3
2013	M	BS 3	4.7	5.3	LfwR	In Scrotum	3.8

2011-2013	Total Fawns Examine	57	
Bite	Underbite	40	72%
	Nor. Bite	16	28%
Sex Ratio	Total F	25	44%
	Total M	32	56%

Total M WTD Fawns (of 22) with malformed scrotum	17	77%
Total M WTD Fawns (of 22) with normal scrotum	5	23%

Detailed Data on Male Fawn Genitalia

Total Measured M Gen	19	100%	
Total Both Testes Ect.	10	53%	
Total Both Testes in S	9	47%	Some scrotums were much shorter than testes
Total No Scrotum Pres	1	5%	
Total One Hemiscrota	1	5%	
Total Misaligned Scr.	9	40%	
Total Bilateral Scrotur	11	50%	
Total Short Pen. Sh.	11	58%	

DATA ON RAVALLI COUNTY WHITE-TAILED DEER FAWNS FOR 2011-2017

2014 F	BS 3					
2014 F	BS 2					
2014 F	BS 3					
2014 F	BS 4					
2014 F	-1					
2014 F	-2					
2014 F	-2					
2014 F	-2					
2014 F	-2					
2014 F	-1.5					
2014 M	BS 4	1.3	LfwR	in scrotum	2.2	
2014 M	-1	1.3	LfwR	in scrotum	1.7	
2014 M	-2	4.3	LfwR	in scrotum	4.2	
2014 M	-2	2.6	LfwR	in scrotum	1.2	
2014 M	NAM NAM		Eaten	Eaten	Eaten	
2015 F	BS 2.5					
2015 F	BS 3					
2015 F	BS 2					
2015 F	-2					
2015 F	-2					
2015 F	-3					
2015 F	-3					
2015 M	BS 4	0.7	LfwR	Ectopic	0.9	
2015 M	BS 3	1.5	LfwR	Ectopic	1.3	
2015 M	-1	3.6	Bilateral	in scrotum	1.8	
2015 M	-2	2.7	Bilateral	in scrotum	3.9	
2015 M	-2	2.7	LfwR	in scrotum	Eaten	
2016 F	BS 3					
2016 F	BS 2					
2016 F	-2					
2016 F	-1					
2016 F	-1					
2016 F	-1					
2016 F	BS 2					
2016 F	-1					
2016 M	No Me	1.2	LfwR	Ectopic	0.7	
2016 M	BS 2	1.3	LfwR	Ectopic	3.4	
2016 M	-2	2.2	Bilateral	Mostly Ect.	2.8	
2017 F	BS 3					
2017 M	-1	0	No scrotum	Ectopic	3.2	
2017 M	BS 3	0	No scrotum	Ectopic	2	

2014 through 2017	Total Fawns Examine	41	
Bite	Underbite	16	41%
	Nor. Bite	23	59%

DATA ON RAVALLI COUNTY WHITE-TAILED DEER FAWNS FOR 2011-2017

Sex Ratio	Total F	26	63%
	Total M	15	37%

Total M WTD Fawns (of 14) with malformed scrotum.	12	86%
Total M WTD Fawns (of 14) with normal scrotum.	2	14%

Detailed Data on Male Fawn Genitalia

Total Measured M Gen	14	100%	
Total Both Testes Ect.	7	50%	
Total Both Testes in S	7	50%	Some scrotums were much shorter than testes
Total No Scrotum Pres	2	14%	
Total Misaligned Scr.	9	64%	
Total Bilateral Scrotur	3	22%	1 had ectopic testes
Total Short Pen. Sh.	8	57%	

Data Summary for all 7 years.

2011 through 2017	Total Fawns Examine	98			
Bite	Underbite	56	59%		
	Nor. Bite	39	41%		
Sex Ratio	Total F	51	52%		
	Total M	47	48%		

Total M WTD Fawns (of 36) with malformed scrotum.	29	81%
Total M WTD Fawns (of 36) with normal scrotum.	7	19%

What is quite concerning is lack of male fawns the last 4 years.

Sex Ratio	Total F	25	44%	2011-2013	57
	Total M	32	56%		
Sex Ratio	Total F	26	63%	2014-2017	41
	Total M	15	37%		

This in addition to males with normal genitalia should be of great concern.

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United States Senate

WASHINGTON, DC 20510-2602

May 7, 2012

Mrs. Judy Hoy
2858 Pheasant Ln
Stevensville, MT 59870-6913

Dear Judy:

I am enclosing the reply I have received from The Environmental Protection Agency in response to my inquiry on your behalf.

If I may be of any further assistance, please contact my office at:

U.S. Senator Max Baucus
8 3rd St E
Kalispell, MT 59901
Phone: 406-756-1150
Fax: 406-756-1152

Sincerely,

Max Baucus

MB/kcr

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
1595 Wynkoop Street
DENVER, CO 80202-1129
Phone 800-227-8917
http://www.epa.gov/region08

Ref: 8RA

APR 24 2012

The Honorable Max Baucus
United States Senator
8 3rd St E
Kalispell, MT 59901

Dear Senator Baucus:

Thank you for your letter of March 16, 2012, on behalf of Mrs. Judy Hoy of Stevensville. In her communication to you, Mrs. Hoy requested that EPA perform testing of foliage, snow and rain water, surface water (streams and rivers) and animal tissue, blood and/or fat at various sites in Montana for endocrine disrupting chemicals (EDCs). She also included an attachment that discusses the photo documentation of a fetal hypothyroidism symptom, brachygnathia, in numerous mammal species by her colleagues and herself. She implies endocrine disrupting chemicals are responsible for these developmental malformations. I can appreciate Mrs. Hoy's concerns with the developmental malformations in wild ruminants in western Montana, and I have the following information in response to Mrs. Hoy's concerns.

My staff contacted Montana Fish, Wildlife, and Parks (MFWP) regarding Mrs. Hoy's concerns with these developmental malformations, and MFWP reported that they have been unable to determine any adverse effects on white-tailed deer populations in western Montana. MFWP further noted the rate of these malformations does not appear to exceed the normal variation within the population, and the productivity and fawn recruitment in the Bitterroot Valley deer populations are considered good by wildlife managers in the area.

During the summer of 2008, the Montana Department of Agriculture (MDA) conducted a project to determine pesticide and nitrate impacts to the water resources of the Bitterroot Valley. Forty-six ground-water samples from 23 wells and 10 surface water samples from 5 sites were collected in June and September and analyzed for 95 pesticide compounds as well as nitrate and nitrite. Following is an excerpt from the report on the results of that sampling:

All of the pesticide concentrations in ground water were low and none exceeded or approached human health drinking water standards, where such standards exist. Nitrate was detected in 24 of the 46 ground-water samples from 13 of the 23 sites. Three samples exceeded 50% of the human health drinking water standard of 10 mg/L. The source(s) of nitrate in ground water were not determined during this project. All of the concentrations in surface water samples were low

and none exceeded or approached the human health drinking water standards or the EPA aquatic life benchmarks. Nitrate was not detected in any of the surface water samples.[1]

Montana's Clean Water Act Information Center (CWAIC) through the Montana Department of Environmental Quality (MTDEQ) provides water quality information about Montana's rivers, streams, lakes and wetlands in relationship to the State's water quality standards. The CWAIC information can be accessed through their web site @ http://www.cwaic.mt.gov/.

Scientific evidence does suggest that environmental exposure to endocrine disrupting chemicals may cause adverse effects in human and wildlife populations. A variety of chemicals have been found to disrupt the endocrine systems of animals in laboratory studies, and there is strong evidence that chemical exposure has been associated with adverse developmental and reproductive effects on fish and wildlife in particular locations. However, considerable uncertainty exists regarding the relationship between exposure to environmental contaminants and adverse health outcomes as EDCs include a wide range of substances, naturally occurring and synthetic including pharmaceuticals, dioxin, dioxin-like compounds, polychlorinated biphenyls, DDT, and other pesticides and plasticizers such as bisphenol A.

Establishing the cause and effect of environmental toxins like EDCs on wild animals is challenging and complicated by normal variation, seasonal responses to breeding and genetically inherited traits. Therefore, studies are best conducted in a laboratory setting under controlled conditions. The science related to measuring and demonstrating endocrine disruption is in its infancy; validated methods of testing that indicate specific effects of an endocrine disruptor are still being developed.

Under provisions of the Food Quality Protection Act of 1996 and the Safe Drinking Water Act Amendments of 1996 EPA is required to screen pesticide chemicals for their potential to produce effects similar to those produced by the female hormone estrogen in humans and gives EPA the authority to screen certain other chemicals and to include other endocrine effects.

The EPA's Endocrine Disruption Screening Program (EDSP) is mandated to use validated methods for screening and testing chemicals to identify potential endocrine disruptors, determine adverse effects, dose-response, assess risk and ultimately manage risk under current laws. These methods or assays, once developed and validated, should allow EPA to identify and characterize the endocrine activity of pesticides, commercial chemicals and environmental contaminants. While EPA has some data on endocrine-disrupting pesticides, the current scientific data available on most of the estimated 87,000 chemicals produced today is insufficient to allow for an evaluation of endocrine associated risks.

[1] Christian Schmidt and Rick Mulder. Montana Department of Agriculture. 2009. *Groundwater and Surface Water Monitoring for Pesticides and Nitrate in the Bitterroot Valley.* (http://agr.mt.gov/agr/Programs/Pesticides/Environmental/Groundwater/Reports/PDF/BitterrootSamplingReport1-09.pdf)

Additional information on EPA's EDSP and the list of chemicals that have been screened or proposed for future screening of potential effects on the endocrine systems can be obtained at http://www.epa.gov/scipoly/oscpendo/index.htm.

In addition to EPA's EDSP, our Office of Research and Development has an EDC research program that funds external research on EDCs that complements EPA's in-house research to improve the scientific methods, data and models to improve the ability to assess the effects of EDCs on wildlife populations (http://www.epa.gov/ncer/science/endocrine/index.html).

The EPA encourages Mrs. Hoy to access the existing environmental data that have already been made available by Montana's State agencies (i.e., MFWP, MDA and MTDEQ) and to continue to monitor the published, peer-reviewed research on EDCs.

Again, thank you for writing; and I hope this information will be helpful in your response to Mrs. Hoy. If the EPA may provide anything further, please contact me or your staff may wish to contact Sandy Fells, our Regional Congressional Liaison, at 303-312-6604 or fells.sandy@epa.gov.

Sincerely,

James B. Martin
Regional Administrator

James Martin states in his April 24, 2012 letter to Senator Baucus, **"My staff contacted Montana Fish, Wildlife, and Parks (MFWP) regarding Mrs. Hoy's concerns with these developmental malformations, and MFWP reported that they have been unable to determine any adverse effects on white-tailed deer populations in Western Montana. MFWP further noted the rate of these malformations does not appear to exceed the normal variation within the population, and the productivity and fawn recruitment in the Bitterroot Valley deer populations are considered good by wildlife managers in the area."**

Interestingly, only white-tailed deer were addressed, even though our 2011 study discussed prevalence of facial bone malformations in 7 ruminant species, 5 wild and 2 domestic. I also sent Senator Baucus photos and data on multiple species of mammal with malformations and photos of multiple individuals of many bird species with similar malformations. It is completely unclear what the MDFWP stating, **"they have been unable to determine any adverse effects on white-tailed deer populations in Western Montana"** has to do with the birth defects on the many species of animal for which we provided data and photos. Additionally, our 2011 study

reported a high prevalence of disrupted development of the facial bones statewide on hunter-killed elk, mule deer, pronghorn antelope and bighorn sheep, not just the white-tailed deer.

Admittedly, our first two studies found a high prevalence of facial malformations, reproductive malformations and a highly skewed sex ratio in favor of males in a sample of hundreds of Bitterroot Valley white-tailed deer fawns. However, because we examined a large sample of white-tailed deer fawns and reported the same malformations, doesn't make white-tailed deer the only animal on which we observed and measured malformations, as MDFWP was quoted to state in their correspondence with James Martin.

For example, our study reported a prevalence of 31% underbite/brachygnathia superior and 13% overbite/mandibular brachygnathia (44% total with facial bone malformations) on hunter-killed elk from throughout Montana. In 2011, the MDFWP began a three-year study on elk cow and calf survival rates in southern Ravalli County because of "low recruitment and population declines" in the elk population. Wolves were blamed for the low calf survival, however the MDFWP study found that of the calves radio collared in 2012 which suffered mortality, wolves killed only 5.3% on the east side of the Bitterroot River valley and 5.6% on the west side, a total of 10.9%. Unknown causes were responsible for far more calf deaths 22.2% on the west side and were equal to the wolves on the east side at 5.3%, for a total of 27.5% for unknown causes in both areas.

When I find newborn ruminants dead of "unknown causes," a necropsy usually shows birth defects are responsible. Some birth defects are internal, such as underdeveloped thymus or enlarged heart, with damaged lungs and defective blood vessels prone to hemorrhaging. Many newborns are too weak at birth to stand and suckle and can't maintain sufficient heat and energy to survive. Herniated umbilicus, contracted tendons, crooked legs and other birth defects also cause mortality soon after birth. The captured elk calves were apparently not examined for facial malformations, even though I strongly suggested this be done. It should be obvious that not being able to graze efficiently after weaning and during the winter causes mortality in immature grazing animals born with an underbite.

The number of licenses for elk, mule deer, white-tailed deer, moose, bighorn sheep and mountain goat has been lowered by MDFWP each year for several years because of declining big game populations. It is strange that MDFWP stated so definitively, **"productivity and fawn recruitment are considered good."** Fawn recruitment for mule deer has been reported by MDFWP to be low in many areas of Montana in recent years. Our data shows a prevalence of 66% with underbite and 5% with overbite (71% total with facial bone malformations) in the 106 mostly adult hunter-killed mule deer that were examined from throughout Montana. Necropsied newborns, including mule deer fawns, elk calves and other species of mammal, were found to have multiple birth defects, many of which cause mortality soon after birth.

Regarding reproductive malformations, the scrotum on a male mammal being misaligned 90 degrees had never been reported in the scientific literature prior to our 2002 study. In a recent Montana Outdoor Report produced by MDFWP, shown on Western Montana news stations on December 16 and 17, 2017, FWP biologists in uniform were shown extensively examining the malformed scrotum (misaligned with the left hemiscrota formed forward of the right) on a male hunter killed white-tailed deer at a check station, while the biologists doing the talking on the report were talking about CWD. This proves that the biologists are looking at the birth defects, contrary to what Mr. Martin was told.

Additionally, underbite had been reported in the scientific literature on only two white-tailed deer fawns prior to our 2011 study. The MDFWP reply to Martin states," the rate of these malformations does not appear to exceed the normal variation within the population" referring to Bitterroot Valley white-tailed deer makes no biological sense. Studies of white-tailed deer were done in Michigan by Ryel (Ryel, L.A. 1963. *The occurrence of certain anomalies in Michigan white-tailed deer.* J Mammol 44: 79-98. doi:10.2307/1377171) and in Ravalli County by O'Gara (O'Gara, B. 1992. *Preliminary report on field collections of white-tailed deer on the Lee Metcalf National Refuge. Stevensville (MT): Lee Metcalf National Wildlife Refuge*, p. 1-30.). There was no underbite (NONE AT ALL) found on the deer in those studies, both done prior to 1995. There is no scientific evidence that underbite can be considered a "normal variation" in the white-tailed deer population, or in the multiple species of ruminant we reported with facial bone malformations in our 2011 study. In addition, websites on domestic ruminants state underbite and overbite are serious birth defects. However, this incongruity did not stop Martin from using that statement to justify the EPA doing no testing or otherwise addressing the malformations. Martin resigned not long after this exchange with Senator Baucus for "personal reasons."

CONCLUSION

It is unknown why personnel working for state and federal agencies will not admit malformations are present on wild grazing animals. The developmental malformations discussed in our three peer reviewed studies have been documented with several hundred photos. Why most of the media (except for the Bitterroot Star) will not publish articles about our studies, research by others on birth defects on domestic animals or anything about the multiple malformations on wild and domestic animals, remains a mystery.

To continue to ignore the existence of serious birth defects on multiple species is likely putting humans at increased risk of having children born with similar symptoms. And this appears to be occurring.

If you have any questions do not hesitate to call me at
1 (406) 777-2487 or email me at bjhoy@localnet.com.

These are the references for the four studies in which I participated and as lead author on the first three:

Hoy JA, Hoy RD, Seba D, Kerstetter TH (2002) Genital abnormalities in white-tailed deer (Odocoileus virginianus) in west-central Montana: Pesticide exposure as a possible cause. *J Environ Biol* 23: 189-197. http://www.ncbi.nlm.nih.gov/pubmed/12602857.

Hoy JA, Haas GT, Hoy RD, Hallock P (2011) Observations of brachygnathia superior in wild ruminants in Western Montana, USA. *Wildl Biol Pract* 7(2): 15-29. http://dx.doi.org/10.2461/wbp.2011.7.13

Hoy J, Swanson N and Seneff S. The High Cost of Pesticides: Human and Animal Diseases. *Poult Fish Wildl Sci.* 2015; 3:132. doi:10.4172/2375-446X.1000132

Swanson N, Hoy J, Seneff S (2016) Evidence that glyphosate is a causative agent in chronic sub-clinical metabolic acidosis and mitochondrial dysfunction. *Int J Hum Nutr Funct Med* epub in press. http://intjhumnutrfunctmed.org/journal/2016pdf/IJHNFM_2016_v4q1p9_GlyphosateMetabolicAcidosisMitochondria.pdf

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Lolo, MT 59847
(406) 273-6827

Bart O'Gara, Ph.D.
Wildlife Consultant
Research Biologist (retired) U.S. Fish and Wildlife Service
Wildlife Professor Emeritus, University of Montana

1 April 1997

To Whom It May Concern:

During late March 1997, Judy Hoy brought seven frozen white-tailed deer fetuses to my house and asked me to look at them and express an opinion concerning whether or not they were normal. Being frozen, absolute determinations were difficult, but: one female fetus appeared to have retarded development of its ears and facial musculature; two fetuses appeared to have lower jaws slightly longer than upper jaws, the opposite of the normal condition--this probably resulted from shortening of the nasal bones and face; and one female fetus had front legs that appeared "spindly" and were extended ahead at a strange angle--being frozen it was impossible to determine the cause of the problem but the legs resembled those of calves from domestic and bison cows that were poisoned by eating lupine.

The above abnormalities were more than I ordinarily have seen per 100-200 fetuses--except in one very inbred pronghorn population. During the winter of 1962-63, I handled most of the fetuses from more than 4,800 elk shot in Yellowstone National Park. During graduate school and 25 years in the U.S. Fish and Wildlife Service I collected and studied thousands more from numerous big game species. Thus, I am not inexperienced concerning the appearance of normal and abnormal fetuses. I also collected and inspected 38 embryos and fetuses from white-tailed does on the Metcalf National Wildlife Refuge between 14 September 1990 and 7 January 1992. None were abnormal, but two--in very old does collected in March and May--were dead.

Respectfully,

Bart W. O'Gara

Bart W. O'Gara
Wildlife Consultant

vj