Pesticide Use in Wyoming on Major Crops and Livestock in 1994[1]

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INTRODUCTION

"Agriculture ranks among the top three industries in Wyoming with an estimated economic impact of well over $1 billion. Cash income from Wyoming agriculture in 1994 totaled about $880 million. About 56 percent of Wyoming land area or 34.6 million acres are controlled and operated by 9,200 farms and ranches. Wyoming ranks ninth nationally in the land in farms and ranches and second nationally in the average size of farms and ranches."[3]

"In 1994, 80 percent of Wyoming farm cash receipts ($621 million) came from marketing of livestock and livestock products. Cattle and calves inventory on January 1, 1995 totaled 1.39 million head, valued at $910 million. Wyoming ranked 28th nationally in cattle inventory. The January 1, 1995 inventory of sheep and lambs was 790,000 head, valued at $60 million. Wyoming ranked third nationally in market sheep and lambs and also for breeding sheep and lambs. Breeding sheep inventory in Wyoming declined 13 percent in 1994. Wyoming again ranked second nationally in wool production. The total value of production for all livestock and livestock products in 1994 was $463 million."[3]

"The major crop producing areas in Wyoming are located in the Southeast, the Big Horn Basin and Wind River Basin. Hay, sugarbeets, and barley were the leading cash crops in Wyoming from 1990 through 1994. The total value of all 1994 crops produced in Wyoming was $289 million, down 7 percent from 1993. The decrease was primarily due to an 8 percent drop in the value of the 1994 hay production to $170 million. The value of the barley crop in 1994 was $23 million, down 11 percent from 1993. Wyoming ranked eighth in sugarbeet production, ninth in dry bean production, and tenth in barley and spring wheat production."[3]

Pesticides play a major role in maintaining agricultural values in Wyoming. To estimate 1994 pesticide usage on the major agricultural commodities produced in Wyoming, a survey was conducted in the winter of 1995. Information from this survey will be valuable when estimating the impact on agricultural production of Environmental Protection Agency proposals to restrict or remove certain pesticides from the market.

This survey was a cooperative effort by the University of Wyoming Cooperative Extension Service, the Department of Plant, Soil, and Insect Sciences and the Department of Agricultural Economic of the College of Agriculture, in cooperation with the Wyoming Agricultural Statistics Service (WASS) and the Wyoming Department of Agriculture. The project was funded by the National Agricultral Pesticide Impact Assessment Program.

METHODS

The questionnaire for the 1994 Wyoming Pesticide Use Survey was originally designed in 1979 and was amended in 1983 and further modified in 1994 by the University of Wyoming Cooperative Extension Service, the Department of Plant, Soil, and Insect Sciences and the Department of Agricultural Economic of the College of Agriculture, in cooperation with the Wyoming Agricultural Statistics Service (WASS) and the Wyoming Department of Agriculture. Survey questionnaires were sent to 2,500 producers randomly selected by the WASS. A reminder letter was sent two weeks later to those who had not yet returned their questionnaires. A second questionnaire was sent two weeks later to those who had not responded to the reminder letter. A phone call was then made to a sample of those who had not

[3] From *Wyoming Agricultural Statistics 1995*, page 20. Published by: Wyoming Department of Agriculture, Wyoming. Agricultural Statistics Service, University of Wyoming, College of Agriculture.

responded to the second reminder letter. Of the 2,500 questionnaires mailed, 1,562 were returned as completed (62.5 percent).

The WASS does not report on total acreage of range and pasture land in Wyoming. Therefore, acreage for range and pasture lands in this survey does not reflect statewide projections. Pesticide usage on range and pasture lands was often reported as being "spot treated" without giving the actual acreage of each “spot”. In this case, we recorded the entire acreage of range and pasture land that was so treated.

Projected acres for crop lands receiving pesticide applications were based on total acres planted to those crops as reported in the 1994 Wyoming Agricultural Statistics. Projected number of cattle, sheep, and hogs that received pesticide applications were also based on total number head as reported in the 1994 Wyoming Agricultural Statistics. Projected number of horses receiving pesticide applications, however, were based on data from the United States Equine Marketing Association concerning Wyoming's 1989 horse population.

This survey is divided into two sections: 1) pesticide use on crops including alfalfa, barley, dry beans, corn, oats, sugar beets, wheat, and range and pasture lands; and 2) pesticide use on livestock including cattle, horses, sheep, and swine. In cases where one pesticide was used in combination with another, each was recorded separately. This resulted in double counting of some acres that were treated with certain kinds of pesticides (e.g., herbicides). Such double counting also occurred when multiple pesticide applications were made.

Producers were asked to provide information on all pesticide usage, including herbicides, insecticides, and fungicides. In addition, they were asked to report the number of acres and/or livestock treated with a specific pesticide. An "other" category was also provided for those who used alternate means of control.

Contents of this survey resulted from information reported and are not to be implied as recommendations from the University of Wyoming Cooperative Extension Service. A copy of the survey questionnaire is available upon request.

Results from the survey questionnaires are presented in tables 1-19. Pesticides are listed by common name.

RESULTS

Summary of 1994 Wyoming Pesticide Use on Specific Crops

The figures reported in this section are statewide projections. These figures were computed by obtaining the percentage of acres reported that were treated with a specific pesticide. This percentage was then multiplied by the total acres of the specific crop planted in the state to obtain the statewide projection (Table 1).

Pesticide Use on Alfalfa. A total of 36 pesticide active ingredients were applied to alfalfa. Fourteen were insecticides and 22 were herbicides. No fungicide applications were reported. Carbofuran was the insecticide that was used the most, having been applied to 81,018 acres. Most of this was applied by air by custom applicators. Picloram was applied to 8,127 acres and represented the most used herbicide. Since picloram is toxic to alfalfa these acres were probably spot sprayed acres for Canada thistle or other difficult to control perennials. All of the picloram was applied by ground by the land owner (Table 2).

Pesticide Use on Barley. A total of 22 pesticide active ingredients were applied to barley. Three were insecticides and 19 were herbicides. No fungicide applications were reported. The insecticide disulfoton was used the most, having been applied to 443 acres. All of the disulfoton was applied by air, mostly by custom applicators. Triallate was applied to 34,914 acres and represented the most use herbicide. Most of the triallate was applied by ground. About ½ was applied by custom applicators (Table 3).

Pesticide Use on Sugarbeets. A total of 19 pesticide active ingredients were applied to sugarbeets. Seven were insecticides, 10 were herbicides and 2 were fungicides. The insecticide terbufos was used the most, having been applied to 31,462 acres. All of the disulfoton was applied by ground, mostly by the land owner. Phenmedipham plus desmedipham was applied to 32,073 acres and represented the most use herbicide. Most of the herbicide was applied by ground by the land owner (Table 4).

Pesticide Use on Dry Beans. A total of 26 pesticide active ingredients were applied to dry beans. Five were fungicides, 13 were herbicides, 7 were insecticides and one was a bactericide,. The fungicide captan was used the most, having been applied to 626 acres. Custom applicators applied 50% of the captan. The insecticide phorate was used the most, having been applied to 810 acres. Custom applicators applied 40% of the phorate with 80% applied by ground and 20% by air. Ethalfluralin was applied to 21,408 acres and represented the most use herbicide. All of the herbicide was applied by ground by the land owner (Table 5).

Pesticide Use on Corn. A total of 36 pesticide active ingredients were applied to corn. Two were fungicides, 21 were herbicides and 13 were insecticides. The fungicide captan was used the most, having been applied to 968 acres. All of the captan was applied by ground, by the land owner. Dicamba was applied to 23,328 acres and represented the most use herbicide. Custom applicators applied 26% of the dicamba with 93% applied by ground sprayers. The insecticide dimethoate was used the most, having been applied to 2,640 acres. Custom applicators applied 71% of the dimethoate with 21% applied by ground and 79% by air (Table 6).

Pesticide Use on Oats. A total of 18 pesticide active ingredients were applied to oats, one fungicide, 13 herbicides and 4 insecticides. The fungicide maneb was applied to 2,173 acres. All of the maneb was applied by ground, by the land owner. 2,4-D was applied to 13,200 acres and represented the most use herbicide. Custom applicators applied 23% of the 2,4-D with 86% applied by ground, 7% by air and 7% by irrigation. The insecticide disulfoton was used the most, having been applied to 968 acres. All of the disulfoton was applied by air, by land owner (Table 7).

Pesticide Use on Wheat. A total of 25 pesticide active ingredients were applied to wheat; two fungicides, 18 herbicides and 5 insecticides. The fungicides captan and maneb were applied to less than 1% of the acres. 2,4-D was applied to 63,428 acres and represented the most use herbicide. Custom applicators applied 47% of the 2,4-D with 84% applied by ground and 16% by air. Insecticides were applied to less than 1% of the wheat acres (Table 8).

Pesticide Use on Potatoes. A total of 14 pesticide active ingredients were applied to potatoes; 5 fungicides, 6 herbicides and 2 insecticides. The fungicide metalaxyl was applied to 253 acres. Custom applicators applied 50% of the metalaxyl with 50% applied by ground. 2,4-D was applied to 596 acres and represented the most used herbicide. 2,4-D is used as a growth regulator for skin color. All of the herbicide was applied by ground by the land owner. The insecticide esfenvalerate was used the most, having been applied to 253 acres. Custom applicators applied 50% of the esfenvalerate with 50% applied by ground and 50% by air (Table 9).

Pesticide Use on Grass Hay. A total of 5 pesticide active ingredients were applied to grass hay. Four were herbicides while malathion was the only insecticide reported. No fungicide applications were reported. Picloram was applied to 26,600 acres and represented the most used herbicide. All of the picloram was applied by air by custom applicators. Malathion was applied to 53,350 acres. All of the malathion was applied by air by custom applicators (Table 10).

Pesticide Use on Improved Pasture. Improved pasture differs from rangeland in that it has been seeded to improved grass varieties, usually for grazing livestock. The acres reported for improved pasture are survey reported acres and not total state acres. A total of 14 pesticide active ingredients were applied to improved pasture. Eleven were herbicides and 2 were insecticides. No fungicide applications were reported. Picloram was applied to 2,021 acres and represented the most used herbicide. The land owner applied 90% of the picloram with 92% applied by ground and 8% by air. Malathion was applied to 520 acres. Custom applicators applied 67% of the malathion with 33% applied by ground and 67% by air (Table 11).

Pesticide Use on Rangeland. A total of 11 herbicide active ingredients were applied to rangeland. No fungicide or insecticide applications were reported. Picloram was applied to 130,482 acres and represented the most used herbicide. The land owner applied 83% of the picloram with 90% applied by ground and 10% by air (Table 12).

The results of this survey may or may not be accurate since the accuracy of the data was dependent upon information received from the survey questionnaires.

Table 1. Summary of Pesticide Use on Specific Crops

Crop[1]	Total State Acres	Herbicides		Insecticides		Fungicides		Other Controls[4]	
		%	Projected Acres	%	Projected Acres	%	Projected Acres	%	Projected Acres
Alfalfa	630,000	7.9	50,048	15.0	94,405	0.4	2,335	3.4	21,627
Barley	110,000	86.9	95,545	2.8	3,044	0.8	932	0.3	324
Dry Beans	46,000	88.8	40,855	9.7	4,472	1.5	690	3.6	1,677
Corn	80,000	83.9	67,085	23.2	18,549	2.3	1,850	1.1	864
Oats	55,000	47.9	26,372	2.5	1,361	0.0	0	0.3	188
Potatoes	1,700	96.0	1,632	14.5	247	14.5	247	0.0	0
Sugarbeets	63,000	92.7	58,414	46.9	29,517	9.7	6,084	6.4	4,033
Wheat	225,000	57.1	128,391	2.6	5,938	0.0	4	1.2	2,684
Rangeland[2]	29,655,013	1.1	332,344	0.0	9,791	0.0	102	0.4	121,149
Improved Pasture[3]	279,517	3.0	8,283	0.2	477	0.0	2	0.4	1,144
Hay	500,000	6.5	32,450	7.0	35,225	0.0	0	0.0	0
Total	31,645,230	2.7	841,420	0.6	203,027	0.0	12,245	0.5	153,689

Notes: 1. Statewide data come from Wyoming Agricultural Statistics (1995);
2. Statewide rangeland figure comes from Wyoming Census of Agriculture (1992);
3. Improved pasture is survey-reported acres instead of state total acres.
4. Other controls include fire and resistant varieties.

Table 2. Pesticide Use on Alfalfa (630,000 state harvested acres - 1994)								
				Application Method (%)			Application (%)	
Pesticide	State projected acres treated	Survey acres treated	Treated acres (%)	Ground	Air	Irrigation	Self	Custom
carbofuran (I)[1]	81,031	14,125	13	20	80	0	14	86
malathion (I)	9,433	1,644	2	60	40	7	60	40
chlopyriphos (I)	8,404	1,465	1	21	79	0	14	86
picloram (H)	8,127	1,412	1	100	0	0	81	19
2,4-D (H)	6,968	1,215	1	79	21	0	71	29

The following pesticides were used on less than one percent of the total alfalfa acres: 2,4-DB (H), 2,4-D ester (H), aldicarb (I), bacillus thuringiensis var. thuringiensis (I), benefin (H), bifenthrine (I), bromoxynil (H), carbaryl (I), clopyralid + 2,4-D (H), clopyralid (H), dicamba (H), dimethoate (I), diquat (H), disulfoton (I), EPTC (H), ethalfluralin (H), fluazifop-butyl (H), glyphosate (H), imazethapyr (H), methyl parathion (I), metribuzin (H), metsulfuron (H), paraquat (H), parathion (I), pendimethalin (H), phosmet (I), pronamid (H), pyrethrin (I), sethoxydim (H), terbufos (I), trifluralin (H).

[1](F) = fungicide; (H) = herbicide; (I) = Insecticide

Table 3. Pesticide Use on Barley (110,000 state planted acres - 1994)								
				Application Method (%)			Application (%)	
Pesticide	State projected acres treated	Survey acres treated	Treated acres (%)	Ground	Air	Irrigation	Self	Custom
triallate (H)[1]	34,916	14,764	32	93	7	0	50	50
2,4-D (H)	21,664	9,160	20	91	9	0	71	29
MCPA (H)	17,336	7,329	16	100	0	0	58	42
clopyralid + 2,4-D (H)	12,407	5,246	11	92	8	0	59	41
picloram (H)	7,304	3,090	7	100	0	0	57	43
dicamba (H)	5,837	2,468	5	100	0	0	50	50
disulfoton (I)	4,898	2,071	4	0	100	0	25	75
bromoxynil (H)	4,433	1,875	4	96	0	4	61	39
imazamethabenz-methyl (H)	4,430	1,873	4	100	0	0	79	21
difenzoquat methyl sulfate (H)	4,046	1,711	4	100	0	0	71	29
metsulfuron (H)	3,779	1,598	3	100	0	0	94	6
2,4-D amine (H)	1,528	646	1	80	20	0	60	40

The following pesticides were used on less than one percent of the total barley acres: 2,4-D ester (H), 2,4-DB (H), bentazon (H), carbofuran (I), chlopyriphos (I), clopyralid (H), diclofop-methyl (H), ethalfluralin (H), fenoxaprop-P (H), glyphosate (H).

[1](F) = fungicide; (H) = herbicide; (I) = Insecticide

Table 4. Pesticide Use on Sugarbeets (63,000 state planted acres - 1994)								
				Application Method (%)			Application (%)	
Pesticide	State projected acres treated	Survey acres treated	Treated acres (%)	Ground	Air	Irrigation	Self	Custom
phenmedipham + desmedipham (H)[1]	32,072	19,231	51	98	0	2	95	5
terbufos (I)	31,463	18,866	50	100	0	0	92	8
ethofumesate (H)	30,442	18,252	48	100	0	0	80	20
clopyralid (H)	19,586	11,744	31	98	0	2	97	3
sethoxydim (H)	12,339	7,399	20	98	0	2	92	8
cycloate (H)	10,004	5,999	16	94	0	6	82	18
aldicarb (I)	9,973	5,980	16	97	0	3	100	0
dichloropropene (I)	4,291	2,573	7	100	0	0	78	22
diethatyl-ethyl (H)	1,806	1,083	3	100	0	0	75	25
EPTC (H)	1,333	799	2	100	0	0	100	0

The following pesticides were used on less than one percent of the total sugarbeet acres: 2,4-D (H), carbaryl (I), carbofuran (I), glyphosate (H), metalaxyl (F), parathion (I), phorate (I), triadimefon (F), trifluralin (H).

[1](F) = fungicide; (H) = herbicide; (I) = Insecticide

Table 5. Pesticide Use on Dry Beans (46,000 state planted acres - 1994)								
				Application Method (%)			Application (%)	
Pesticide	State projected acres treated	Survey acres treated	Treated acres (%)	Ground	Air	Irrigation	Self	Custom
ethalfluralin (H)[1]	21,408	9,066	47	100	0	0	54	46
EPTC (H)	13,041	5,523	28	100	0	0	51	49
trifluralin (H)	6,086	2,577	13	94	6	0	41	59
alachlor (H)	3,275	1,387	7	100	0	0	53	47
metolachlor (H)	2,134	904	5	100	0	0	56	44
phorate (I)	810	342	2	80	20	0	60	40
dimethoate (I)	750	318	2	0	100	0	0	100
captan (F)	625	265	1	100	0	0	50	50
bentazon (H)	552	233	1	100	0	0	71	29

The following pesticides were used on less than one percent of the total dry bean acres: benomyl (F), butylate (H), carbaryl (I), carboxin (F), clopyralid (H), copper hydroxide (F), diethatyl-ethyl (H), esfenvalerate (I), ethofumesate (H), glyphosate (H), malathion (I), maneb (F), methoxychlor (I), parathion (I), pendimethalin (H), sethoxydim (H), streptomycin (bactericide).

[1](F) = fungicide; (H) = herbicide; (I) = Insecticide

Table 6. Pesticide Use on Corn (80,000 state planted acres - 1994)

Pesticide	State projected acres treated	Survey acres treated	Treated acres (%)	Application Method (%)			Application (%)	
				Ground	Air	Irrigation	Self	Custom
dicamba (H)[1]	23,330	12,045	29	97	3	0	74	26
2,4-D (H)	17,347	8,956	22	100	0	0	81	19
terbufos (I)	12,270	6,335	15	100	0	0	93	7
cyanazine (H)	11,969	6,179	15	91	9	0	70	30
atrazine (H)	6,710	3,464	8	100	0	0	67	33
alachlor (H)	6,688	2,704	8	100	0	0	78	22
nicosulfuron (H)	4,552	2,350	6	100	0	0	67	33
EPTC (H)	4,432	2,251	6	100	0	0	89	11
butylate (H)	2,690	1,389	3	83	17	0	67	43
dimethoate (I)	2,638	1,362	3	21	79	0	29	71
pendimethalin (H)	2,348	1,212	3	88	12	0	63	38
metolachlor (H)	2,082	1,075	3	100	0	0	25	75
chlopyriphos (I)	1,972	1,018	2	100	0	0	89	11
2,4-D ester (H)	1,615	834	2	100	0	0	83	17
fonophos (I)	1,089	562	1	80	20	0	80	20
bromoxynil (H)	1,075	555	1	100	0	0	71	29
sodium chlorate (H)	1,075	555	1	100	0	0	67	33
captan (F)	968	500	1	100	0	0	100	0
acetochlor (H)	968	500	1	100	0	0	100	0
glyphosate (H)	779	402	1	100	0	0	50	50

The following pesticides were used on less than one percent of the total corn acres: captan (F) + diazinon (I), carbaryl (I), carbofuran (I), clopyralid (H), dimethenamid (H), esfenvalerate (I), imazamethabenz-methyl (H), lindane (I), malathion (I), MCPA (H), metribuzin (H), parathion (I), phorate (I), picloram (H), tefluthrin (I).

[1](F) = fungicide; (H) = herbicide; (I) = Insecticide

Table 7. Pesticide Use on Oats (55,000 state planted acres - 1994)								
				Application Method (%)			Application (%)	
Pesticide	State projected acres treated	Survey acres treated	Treated acres (%)	Ground	Air	Irrigation	Self	Custom
2,4-D amine (H)[1]	13,200	2,708	24	86	7	7	77	23
picloram (H)	7,047	1,460	13	90	10	0	80	20
maneb (F)	2,172	450	4	100	0	0	100	0
MCPA (H)	1,834	380	3	100	0	0	67	33
glyphosate (H)	1,718	356	3	100	0	0	71	29
dicamba (H)	1,627	337	3	100	0	0	77	23
bromoxynil (H)	1,347	279	2	100	0	0	50	50
clopyralid + MCPA (H)	1,231	255	2	83	17	0	83	17
disulfoton (I)	965	200	2	0	100	0	100	0

The following pesticides were used on less than one percent of the oat acres: 2,4-D ester (H), carbofuran (I), clopyralid (H), diclofop-methyl (H), difenzoquat metilsulfate (H), dimethoate (I), metsulfuron (H), terbufos (I), tribenuron-methyl (H).

[1](F) = fungicide; (H) = herbicide; (I) = Insecticide

Table 8. Pesticide Use on Wheat (225,000 state planted acres - 1994)								
				Application Method (%)			Application (%)	
Pesticide	State projected acres treated	Survey acres treated	Treated acres (%)	Ground	Air	Irrigation	Self	Custom
2,4-D amine (H)[1]	63,428	34,506	28	84	16	0	53	47
metsulfuron (H)	25,347	14,470	11	79	21	0	41	59
dicamba (H)	16,352	9,335	7	88	22	0	59	41
triasulfuron (H)	13,926	7,950	6	63	37	0	50	50
picloram (H)	10,964	6,259	5	91	3	3	66	34
metsulfuron + chlorsulfuron (H)	9,950	5,680	4	100	0	0	78	22
glyphosate (H)	9,421	5,378	4	100	0	0	75	25
2,4-D ester (H)	9,351	5,338	4	75	25	0	50	50
clopyralid (H)	3,449	1,969	2	100	0	0	73	17

The following pesticides were used on less than one percent of the wheat acres: atrazine (H), barban (H), bromoxynil (H), captan (F), carbofuran (I), carboxin (F), chlopyriphos (I), dicamba + glyphosate (H), difenzoquat metilsulfate (H), disulfoton (I), malathion (I), maneb (F), MCPA (H), phorate (I), triallate (H), tribenuron + thifensulfuron (H), tribenuron-methyl (H).

[1](F) = fungicide; (H) = herbicide; (I) = Insecticide

Table 9. Pesticide Use on Potatoes (1,700 state planted acres - 1994)								
				Application Method (%)			Application (%)	
Pesticide	State projected acres treated	Survey acres treated	Treated acres (%)	Ground	Air	Irrigation	Self	Custom
2,4-D (H)[1]	596	434	35	100	0	0	100	0
picloram (H)	298	217	18	100	0	0	100	0
metalaxyl (F)	253	184	15	50	50	0	50	50
esfenvalerate (I)	253	184	15	50	50	0	50	50
metribuzin + metolachlor (H)	247	180	15	100	0	0	0	100
metalaxyl+ chlorothalonil (F)	247	180	15	0	100	0	0	100
chlorothalonil (F)	247	180	15	0	100	0	0	100
thiabendazole (F)	247	180	15	100	0	0	100	0
pendimethalin (H)	62	45	4	100	0	0	0	100
metribuzin (H)	62	45	4	100	0	0	0	100

The following pesticides were used on less than one percent of the potatoe acres: captan (F), carbofuran (I), glyphosate (H), phorate (I).

[1](F) = fungicide; (H) = herbicide; (I) = Insecticide. 2,4-D is used as a growth regulator for skin color on potatoes.

Table 10. Pesticide Use on Grass Hay (500,000 state harvested acres - 1994)								
				Application Method (%)			Application (%)	
Pesticide	State projected acres treated	Survey acres treated	Treated acres (%)	Ground	Air	Irrigation	Self	Custom
malathion (I)[1]	53,350	430	11	0	100	0	0	100
picloram (H)	26,600	120	5	0	100	0	0	100
clopyralid (H)	7,300	80	1	100	0	0	50	50
metsulfuron (H)	2,000	30	0.4	100	0	0	100	0
2,4-D amine (H)	1,994	30	0.4	100	0	0	100	0

[1](F) = fungicide; (H) = herbicide; (I) = Insecticide

Table 11. Pesticide Use on Improved Pasture (279,516 survey acres - 1994)								
				Application Method (%)			Application (%)	
Pesticide	No of obvs.	Survey acres treated	Treated acres (%)	Ground	Air	Irrigation	Self	Custom
picloram (H)[1]	48	2,021	0.72	92	8	0	90	10
2,4-D amine (H)	34	1,533	0.55	94	3	3	91	9
dicamba (H)	19	937	0.34	100	0	0	84	16
clopyralid (H)	15	824	0.29	100	0	0	100	0
malathion (I)	3	520	0.19	33	67	0	33	67
MCPA (H)	3	420	0.15	100	0	0	100	0
glyphosate (H)	10	380	0.14	100	0	0	90	10
2,4-D ester (H)	6	357	0.13	100	0	0	67	33
bacillus thuringiensis (I)	1	200	0.07	0	100	0	0	100
metsulfuron (H)	2	150	0.05	50	50	0	50	50
paraquat (H)	2	74	0.03	100	0	0	100	0
tebuthiuron (H)	2	35	0.01	100	0	0	50	50
chlorsulfuron (H)	1	5	0.00	100	0	0	100	0
permethrin (I)	1	3	0.00	100	0	0	100	0

[1](F) = fungicide; (H) = herbicide; (I) = Insecticide

Table 12. Pesticide Use on Rangeland (29,655,013 state acres)								
				Application Method (%)			Application (%)	
Pesticide	State projected acres treated	Survey acres treated	Treated acres (%)	Ground	Air	Irrigation	Self	Custom
picloram (H)[1]	129,775	16,489	0.44	90	10	0	83	17
2,4-D amine (H)	47,372	6,039	0.16	88	11	1	76	24
metsulfuron + chlorsulfuron (H)	47,222	6,000	0.16	100	0	0	100	0
tebuthiuron (H)	16,622	2,112	0.06	38	62	0	25	75
dicamba (H)	16,288	2,070	0.05	100	0	0	93	7
2,4-D ester (H)	12,199	1,550	0.04	80	20	0	60	40
glyphosate (H)	5,525	702	0.02	100	0	0	71	29
dicamba + 2,4-D amine (H)	2,361	300	0.01	100	0	0	100	0
paraquat (H)	2,267	288	0.01	0	100	0	0	100
clopyralid (H)	1,062	135	0.00358	100	0	0	71	29
metsulfuron (H)	314	40	0.00106	100	0	0	100	0
fosamine-ammonium (H)	157	20	0.00053	100	0	0	0	100
chlorsulfuron (H)	80	10	0.00027	100	0	0	0	100

[1](F) = fungicide; (H) = herbicide; (I) = Insecticide

Summary of Pesticide Use on Livestock

The figures reported in this section are statewide projections. These figures were computed by obtaining the percentage of livestock reported that were treated with a specific pesticide. This percentage was then multiplied by the total number of livestock in the state to obtain the statewide projection (Table 13).

Table 13. Summary of Pesticide Use on Livestock

Livestock[1]	Total No. of Animals in 1994	Percentage Treated	Projected No. of Animals Treated
Cattle	1,390,000	32.5	451,750
Horses[2]	40,671	33.9	13,787
Sheep	790,000	27.3	215,670
Swine	51,000	78.1	39,831

Notes:

[1]State total numbers of cattle, sheep and swine come from Wyoming Agricultural Statistics (1995);

[2]State total number of horses comes from Wyoming Census of Agriculture (1992).

Pesticide Use on Cattle

A total of 30 pesticides were used on cattle. Famphur and ivermectin were used more than the other pesticides on cattle. Famphur was used on 451 thousand head (33%) and ivermectin was used on 432 thousand head (31%) (Table 14).

Pesticide Use on Horses

A total of 13 pesticides were used on horses. Ivermectin was used more than the other pesticides on horses. Ivermectin was used on 4,876 head (34%) (Table 15).

Pesticide Use on Sheep

A total of 16 pesticides were used on sheep. Fenthion was used more than the other pesticides on sheep. Fenthion was used on 215 thousand head (27%) (Table 16).

Pesticide Use on Swine

A total of 9 pesticides were used on swine. Ivermectin was used more than the other pesticides on swine. Ivermectin was used on 39,831 head (78%) (Table 17).

Table 14. Pesticide Use on Cattle (1,390,000 state reported head - 1994)				
Pesticide	No of obvs.	State projected head treated	Survey Treated (Head)	Cattle Treated (%)
famphur (I)[1]	592	451,333	282,492	32.47
ivermectin (I)	484	432,429	270,652	31.11
fenthion (I)	93	67,693	42,330	4.87
permethrin (I)	75	53,376	33,384	3.84
coumaphos (I)	57	31,970	20,019	2.30
tetrachlorvinphos (I)	29	21,128	13,197	1.52
trichlorfon (I)	24	17,792	11,178	1.28
fenvalerate (I)	15	12,232	7,667	0.88
diazinon (I)	15	10,564	6,619	0.76
methoprene (I)	6	4,031	2,550	0.29
phosmet (I)	2	2,085	1,309	0.15
phenothiazine (I)	4	1,807	1,128	0.13
dichlorvos (I)	6	1,807	1,097	0.13
cypermethrin+piperonyl butoxide (I)	3	1,807	1,090	0.13
diflubenzuron (I)	3	1,668	1,050	0.12
methomyl+muscamone (I)	2	973	580	0.07
chlopyriphos (I)	7	834	492	0.06
methoxychlor (I)	5	695	437	0.05
naled (I)	2	695	420	0.05
flucythrinate (I)	1	417	300	0.03
dioxathion (I)	2	417	251	0.03
lambda-cyhalothrin (I)	1	417	230	0.03
lindane (I)	1	278	200	0.02
methomyl+tricolure (I)	1	278	160	0.02
cyfluthrin (I)	1	139	125	0.01
pyrethrin (I)	1	139	100	0.01
malathion (I)	2	0	25	0.00

[1]I = Insecticide

Table 15. Pesticide Use on Horses (40,671 state reported head - 1992)				
Pesticide	No. of Obvs.	State projected head treated	Survey Treated (Head)	Horses Treated (%)
ivermectin (I)[1]	206	4,876	3,301	33.86
pyrethrin (I)	14	328	258	2.65
fenvalerate (I)	22	267	237	2.43
permethrin (I)	22	292	184	1.89
pyrethrins + piperonyl butoxide + butoxypolypropylene (I)	2	89	89	0.91
coumaphos (I)	6	63	57	0.59
tetrachlovinphos (I)	3	32	32	0.33
fenthion (I)	5	33	25	0.26
dichlorvos (I)	6	34	24	0.25
diazinon (I)	2	22	14	0.14
malathion (I)	1	5	5	0.05
methomyl + muscamone (I)	2	9	5	0.05
methoxychlor (I)	1	NA	3	0.03

[1]I = Insecticide

Table 16. Pesticide Use on Sheep (790,000 state reported head - 1994)				
Pesticide	No. of Obs.	State projected head treated	Survey Treated (Head)	Sheep Treated (%)
fenthion (I)[1]	125	215,354	192,861	27.26
fenvalerate (I)	41	15,168	13,571	1.92
cresols (I)	4	12,087	8,800	1.53
coumaphos (I)	3	7,347	6,602	0.93
trichlorfon (I)	9	5,846	5,322	0.74
dimethoate (I)	7	4,661	4,195	0.59
naled (I)	2	2,765	2,500	0.35
lindane (I)	1	2,212	2,000	0.28
ivermectin (I)	2	1,580	1,441	0.20
methomyl + muscamone (I)	3	1,027	900	0.13
methomyl + tricolure (I)	1	1,027	900	0.13
cresylic acid,coal tar acids,coal tar phenols,or coal tar (I)	1	395	378	0.05
methoxychlor (I)	1	237	200	0.03
pyrethrin (I)	1	79	100	0.01
diazinon (I)	1	0	10	0.00

[1]I = Insecticide

Table 17. Pesticide Use on Swine (51,000 state reported head - 1994)				
Pesticide	No. of Obs.	State projected head treated	Survey Treated (Head)	Swine Treated (%)
ivermectin (I)[1]	33	39,831	9,362	78.10
phosmet (I)	2	1,596	375	3.13
permethrin (I)	2	464	109	0.91
piperazine (I)	1	423	100	0.83
coumaphos (I)	1	296	70	0.58
dichlorvos (I)	3	275	65	0.54
fenthion (I)	2	275	65	0.54
lindane (I)	1	168	40	0.33
methomyl + muscamone (I)	2	128	30	0.25

[1]I = Insecticide

Comparisons Between Previous Wyoming Pesticide Survey Data

Table 18. Comparison between the percent of acres receiving pesticide applications for various crops in 1983[1], 1990[2] and 1994.

	Percent Acres Treated								
	Herbicides			Insecticides			Fungicides		
Crop	1983	1990	1994	1983	1990	1994	1983	1990	1994
Alfalfa	7.3	6.8	7.9	10.7	12.4	15.0	2.0	1.0	0.4
Barley	64.0	75.4	86.9	1.1	12.4	2.8	10.9	18.2	0.8
Dry beans	95.4	100.0	88.8	11.5	4.2	9.7	21.3	16.8	1.5
Corn	96.0	88.8	83.9	36.0	45.6	23.2	13.3	10.2	2.3
Oats[3]	42.8	30.4	47.9	----	2.2	2.5	5.3	5.4	0.0
Potatoes[4]	----	----	96.0	----	----	14.5	----	----	14.5
Sugarbeets	98.5	84.1	92.7	65.7	100.0	46.9	38.2	23.1	9.7
Wheat	34.0	48.7	57.1	6.4	48.8	2.6	7.5	38.9	0.0
Range & pasture[5]	----	23.4	4.1	----	1.4	0.0	----	0.0	0.0
Hay (grass)[6]	----	----	6.5	----	----	0.2	----	----	0.0

[1]See Taylor, D.T., M.A. Ferrell, A.F. Gale, 3and T.D. Whitson. 1986. Pesticide Use in Wyoming 1983. University of Wyoming Cooperative Extension Service Publication RJ 126.
[2]See Legg, D.E., M.A. Ferrell, D.T. Taylor and D.L. Kellogg. 1992. Pesticide Use in Wyoming 1990. University of Wyoming Cooperative Extension Service Publication RJ 211.
[3]Percent of oats receiving insecticide applications were not reported in the 1983 survey.
[4]Percent of potatoes receiving pesticide applications were not reported in the 1983 or 1990 survey.
[5]Percent of range and pasture lands receiving pesticide aplications were not reported in the 1983 survey.
[6]Percent of hay receiving pesticide applications were not reported in the 1983 or 1990 survey.

Table 19. Comparison between the percent of livestock receiving insecticide applications for 1983[1], 1990[2] and 1994.			
Livestock	1983	1990	1994
Cattle	80.9	78.2	32.5
Horses	22.7	39.1	33.9
Sheep	71.5	37.3	27.3
Swine	44.4	22.3	78.1

[1]See Taylor, D.T., M.A. Ferrell, A.F. Gale, 3and T.D. Whitson. 1986. Pesticide Use in Wyoming 1983. University of Wyoming Cooperative Extension Service Publication RJ 126.
[2]See Legg, D.E., M.A. Ferrell, D.T. Taylor and D.L. Kellogg. 1992. Pesticide Use in Wyoming 1990. University of Wyoming Cooperative Extension Service Publication RJ 211.

Appendix A (common and trade names of pesticides)

Fungicides	
Common Name	**Trade Names**
benomyl	Benlate
captan	Captan
carboxin	Vitavax
chlorothalonil	Bravo
copper hydroxide	Blue Shield, Champ, Champion, Coppercide 50, Kocide 101
maneb	Maneb
metalaxyl	Ridomil
thiabendazole	Arbortect, Mertect, Storite, TBZ, Tecto, Thibenzole
triadimefon	Bayleton
triforine	Denarin, Funginex, Saprol

Herbicides	
Common Name	**Trade Names**
2,4-DB	Butyrac, Butoxone
2,4-D	Many
2,4-D ester	Many
2,4-D amine	Many
acetochlor	Harness, Surpass, Trophy
alachlor	Lasso
atrazine	Aatrex, Atrazine
barban	Carbyne
benefin	Balan
bentazon	Basagran
bromoxynil	Buctril
butylate	Sutan
chlorsulfuron	Glean, Telar
clopyralid + MCPA	CurtailM
clopyralid	Stinger
clopyralid + 2,4D	Curtail

Herbicides	
Common Name	**Trade Names**
cyanazine	Bladex
cycloate	Ro-Neet
dicamba + glyphosate	Fallow Master
dicamba	Banvel
diclofop methyl	Hoelon
diethatyl ethyl	Antor
difenzoquat metilsulfate	Avenge
dimethenamid	Frontier
diquat	Reglone, Reglox, Reward, Diquat Herbicide, Aquacide, Weedtrine-D
EPTC	Eptam
ethalfluralin	Sonalan
ethofumesate	Nortron
fenoxaprop-P	Bugle, Option, Option II, Whip 360
fluazifop-butyl	Fusilade
glyphosate	Roundup, Rodeo
imazamethabenz-methyl	Assert, Dagger
imazethapyr	Pursuit
MCPA	many
metolachlor	Dual
metribuzin + metolachlor	Sencor + Dual
metribuzin	Sencor, Lexone
metsulfuron	Ally, Escort
nicosulfuron	Accent, Accent SP
paraquat	Gramoxone, Cyclone
pendimethalin	Prowl
phenmedipham + desmedipham	Betamix
picloram	Tordon
pronamid	Kerb
sethoxydim	Poast
sodium chlorate	Atlacide

Herbicides	
Common Name	**Trade Names**
tebuthiuron	Spike
triallate	Fargo
triasulfuron	Amber
tribenuron + thifensulfuron	Harmony Extra
tribenuron-methyl	Express
trifluralin	Treflan

Insecticides	
Common Name	**Trade Names**
aldicarb	Temik
bacillus thuringiensis	Acrobe, Agree, Design, Dipel, Vault, Vectobac, Xen Tari
bifenthrine	Talstar
carbaryl	Sevin
carbofuran	Furadan
chlopyriphos	Lock-On, Lorsban
coumaphos	Co-Ral
cresols	Cresol
cresylic acid, coal tar acids, coal tar phenols, or coal tar	many
cyfluthrin	Baythroid
cypermethrin + piperonyl butoxide	Ammo + Butacide
diazinon	DCzCn diazinon, Knox Out
dichloropropene	Telone II
dichlorvos	Equigard, Equigel, Horse-wormer
diflubenzuron	Dimilin
dimethoate	Cygon
dioxathion	Delnav
disulfoton	Di-Syston
esfenvalerate	Asana
famphur	Warbex

Insecticides	
Common Name	**Trade Names**
fenthion	Lysoff, Spotton, Tiguvon, Baytex
fenvalerate	Ectrin, Pydrin
flucythrinate	Cybolt
ivermectin	Ivermectin
lambdacyhalothrin	Karate
lindane	Lindane
malathion	Cythion
methoprene	Altosid, Altosid Briquets, Altosid SR-10, Apex, Diacon, Dianex, Kabat, Manta, Minex, Pharorid, Precor
methoxychlor	Marlate, Drexel Methoxychlor, Methoxychlor 300, Prentox Methoxychlor
methyl parathion	Penncap-M
naled	Dibrom 8 Emulsive
parathion	Penncap-M
permethrin	many
phenothiazine	Hypolin
phorate	Thimet
phosmet	Imidan
pyrethrin	Pyrenone
pyrethrins + piperonyl butoxide + butoxypolypropylene	many
tefluthrin	Force
terbufos	Counter
tetrachlorvinphos	Rabon, Debantic, Appex, Dust M, Gardcide, Gardona
trichlorfon	Dipterex, Dylox , Proxol

Index of Pesticides by Common Name

(F) = fungicide; (H) = herbicide; (I) = Insecticide