

Statistical Methodology

Name of Survey: 2011 NAHMS Sheep Study

Name of Summary: Agricultural Chemical Usage 2010 Sheep and Sheep Facilities (*Access at USDA-NASS Quick Stats: <http://quickstats.nass.usda.gov/>. See Sector: Environmental, Group: Livestock*)

Data Collection Period: January to February 2011

Sample Size, Sampling Frames and Methods:

The 2011 National Animal Health Monitoring Service (NAHMS) Sheep Study targeted any operation that reported positive ewes on previous NASS surveys in the 22 selected states. These states are California, Colorado, Idaho, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, Montana, New Mexico, New York, Ohio, Oregon, Pennsylvania, South Dakota, Texas, Utah, Virginia, Washington, Wisconsin, and Wyoming. The 22 selected States accounted for over 80 percent of the U. S. sheep inventory published by NASS. For this survey, the final sample consisted of 4,923 operations.

To reduce response burden, the sample was split into two sub-populations: operations with 1-19 ewes, and those with 20 or more ewes. Those operations with less than 20 ewes were interviewed by phone and operations with 20 or more ewes were personally interviewed. Chemical data was collected only for those operations with 20 or more ewes. This sub-sample consisted of 3,542 operations. This is in contrast to the 2001 NAHMS Sheep Study where the sample included all sheep and sheep facilities.

Sample Unit and Reporting Unit: The sample unit was the individual operation.

Modes of Data Collection: Personal and telephone interview.

Selected Terms and Definitions:

Active Ingredient: The specific pesticide ingredient which kills or controls the target pest(s) or other target material(s), or otherwise results in the pesticide effect(s). All pesticide-use estimates in the report are at the active ingredient level; one or more active ingredients are present in known amounts in the pesticide products reported in survey.

Estimates of active ingredient use were reported in a single unit of equivalence, per ingredient. For salt, ester, or amine active ingredients, estimates were reported in the parent acid equivalents. For example, the acid derivatives glyphosate isopropylamine salt and 2,4-D, 2-ethylhexyl ester were reported in the glyphosate and 2,4-D equivalents, respectively. For copper compounds, estimates were reported in the metallic copper equivalent.

Active Ingredient Code: A unique code assigned to each active ingredient upon registration with the Environmental Protection Agency's (EPA) Office of Pesticide Programs, to facilitate pesticide regulation.

Dip: A liquid formulation of an insecticide used to protect animals from infestation against external parasites. The dips are either applied directly to the animal or by dipping the animal into a pesticide solution.

Dust Bags: An application method where the chemical is applied by either the animal hitting the bag containing an insecticide or a person shaking the bag over the animal.

Ear Tags: Metal or plastic devices attached to an animal's ear which may contain an insecticide. These ear tags are usually used for ear tick and horn fly control.

Facility: A structure and/or area where the animals are located or to which they have access.

Farm: Any place from which \$1,000 or more of agricultural products were produced and sold, or normally would have been sold, during the year. Government payments are included in sales.

Feed Bunk: A long trough used to feed livestock. Feed may be distributed with an elevator or auger running the length of the feeder or by driving a feed wagon along the feeder.

Feed/Mineral Block: Solid cube of nutrients/minerals for animals which may also contain insecticides.

Injectables: Pesticides applied by injection. Some injectables control internal parasites with added benefit of external control.

Lambing Pen: A small fenced in area for birthing.

Lambing Shed: A structure for birthing and housing sheep.

Pesticides: Defined by the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) as "(1) any substance or mixture of substances intended for preventing, destroying, repelling or mitigating any pest, (2) any substance or mixture of substances intended for use as a plant regulator, defoliant, or desiccant, and (3) any nitrogen stabilizer...(*Title 7, U.S. Code, 136*)."
Under FIFRA, pesticides are registered and regulated through EPA's Office of Pesticide Programs. Three classes of pesticides are included in the report: (1) insecticides targeting insects (2) fungicides targeting fungi, and (3) other chemicals targeting all other pests or other materials.

Pour-ons: Insecticides formulated for direct application to the backlines of animals. The chemical is absorbed through the skin and circulates through the animal's system.

Rate per Marketing Year: Ratio indicating grams of pesticide active ingredient applied, counting all applications per marketing year, per head. (*In Quick Stats: Applications, Measured in Grams/Head/Year*)

Rate per Application: Ratio indicating grams of a pesticide active ingredient applied, per single application, per head. (*In Quick Stats: Applications, Measured in Grams/Head/Application*)

Rubbing Device (Backrubber, Face Rubber): Backrubbers are another method of insecticide self-treatment for animals. Animals bothered by insects rub against devices soaked with insecticides. Backrubbers are placed where animals move to and from, such as between watering areas and pasture.

Sprays: Emulsifiable concentrates or soluble formulations are usually used with smaller sprayers. Animals are usually sprayed with enough solution to cover the animal thoroughly.

Data Review and Estimation Procedures: The 2010 sheep and sheep facility chemical usage estimates were based on data collected, reviewed, and verified through the cooperative efforts of the USDA-NASS Environmental and Demographics Section and Program-State Field Offices.

This survey collected data for insecticides and chemical products that were applied to control external pests. These data exclude pharmaceutical products that treat sheep for internal pests. A pharmaceutical is classified as a drug and is regulated by the Federal Drug Administration (FDA). Pharmaceuticals generally target internal livestock pests such as viruses, bacteria, or worms. Some products can be classified as either a pesticide or a pharmaceutical because they treat both external and internal pests. Examples of dual purpose products are Doramectin and Ivermectin. These products can be applied to sheep internally through oral dosage or injection, or applied externally as a pour-on. Disinfectants and sanitizers are excluded, only insecticide data were collected and summarized.

Insecticide use information on chemical applications made to sheep facilities is also included in this report. For survey purposes, lambing sheds, barns, feed bunks, lean-to's and lambing pens are examples of sheep facilities. Herbicide and termite chemical applications are excluded, as are all rodenticides.

NASS maintains chemical use databases which contain product recommended use ranges and active ingredient concentrations per product. These databases are used to review pesticide product usage data and to convert pesticide product usage data to the equivalent active ingredient levels for publication. Review and finalization of all data proceeded with assessment of reasonableness and consistency at the record and U.S. levels.

Reliability: Estimates were subject to sampling variability; sampling variability was measured by the coefficient of variation (cv), expressed as a percent of the estimate. Coefficients of variation differed considerably by variable and chemical. The narrower the numerical range of responses per variable and the larger the number of positive responses per variable, the smaller the sampling variability. For these reasons, cv's were generally lower for active ingredient *Rate of Application* estimates and for estimates associated with the most often reported active ingredients. For example, estimates of a commonly used active ingredient such as Permethrin will exhibit less variability than a rarely used chemical such as Pyriproxyfen.

Estimates were additionally subject to non-sampling errors. Non-sampling errors result when the target population is mis-defined through list duplication or incompleteness, or sample unit data are mis-recorded through mistakes in reporting, recording, or processing the data. Strict quality controls implemented at each step of the survey and data review process minimized the occurrence and magnitude of non-sampling errors.

Revision Policy: Estimates are final at first release, and are not subject to revision.