Integrated Pest Management (IPM) for Livestock

INTRODUCTION AND FUNDAMENTAL CONCEPTS

Livestock farming faces challenges from various pests, including parasites, diseases, and environmental factors. Integrated Pest Management (IPM) for livestock is a science-based approach that aims to identify and reduce risks from pests while considering economic and environmental factors. The following outlines a comprehensive IPM program for livestock:

Scouting Livestock for Pests:

- Regular monitoring of livestock conditions is essential for a successful IPM program.
- Conduct routine inspections to identify pests, monitor the health of animals, and assess environmental conditions.
- Keep records of livestock locations, health status, past pest issues, and any treatments applied.
- Utilize methods such as visual inspections, health checks, and environmental assessments to identify pests and potential issues.

Disease Monitoring:

- Monitor livestock for signs and symptoms of diseases.
- Implement a system for early detection, including regular veterinary checks and diagnostic testing.
- Maintain records of disease history, treatments, and vaccination schedules.

Parasite Control:

- Implement measures to control internal and external parasites.
- Utilize strategies such as rotational grazing, proper manure management, and targeted treatments based on parasite life cycles.
- Consider genetic selection for parasite resistance in livestock breeds.

Livestock Growth Stages:

- Understand the growth stages of livestock and their susceptibility to pests.
- Tailor pest control measures to specific growth stages to maximize effectiveness and minimize harm to animals.

Economic Thresholds and Injury Levels:

- Establish economic thresholds for pests, defining the point at which control measures are justified to prevent economic losses.
- Monitor for injury levels in livestock and set thresholds for intervention.
- Consider the economic injury level (EIL) as the point where the cost of control equals the potential loss.

Weed Management for pastures:

- Address weeds that may impact livestock nutrition and health.

- Utilize a combination of practices, including pasture management, mowing, and targeted herbicide use.
- Consider economic thresholds for weed density that justifies control measures.

Biosecurity Measures:

- Implement biosecurity practices to prevent the introduction and spread of diseases.
- Quarantine new animals, practice hygiene, and control movement between different livestock groups.

Integrated Pest Management Strategies:

- Adopt a multi-faceted approach to pest management, including:
    - Cultural controls (e.g., pasture rotation, proper nutrition).
    - Mechanical controls (e.g., fly traps, physical barriers).
    - Biological controls (e.g., predator introduction, beneficial microorganisms).
    - Genetic controls (e.g., breeding for resistance).
    - Chemical controls (judicious use of veterinary medications).

Education and Training:

- Provide training to livestock managers and workers on pest identification, monitoring, and control measures.
- Encourage responsible and judicious use of veterinary medications.
- Employees who apply pesticides should hold an operators License with the Illinois Department of Agriculture.

Continuous Improvement:

- Regularly review and update the IPM program based on experience, new research, and changing pest dynamics.
- Emphasize sustainable and environmentally friendly practices.

Crop Sciences IPM Approach

INTRODUCTION AND FUNDAMENTAL CONCEPTS

Agricultural ecosystems, or agroecosystems, contain far less diversity of animal and plant species than occurs naturally. Because of this lack of diversity of organisms and the frequent human-imposed disturbances placed on agroecosystems, such as tillage operations, mowing, or the use of pesticides, certain populations of organisms may increase and threaten the profitable production of a given crop. Populations of organisms whose densities reach levels that begin to compete against the desired production of food and fiber are referred to as pests.

Integrated pest management, or IPM, is a science-based decision-making process that identifies and reduces risks from both pests and pest control methods. IPM integrates the use of pest biology, environmental information, and available technology to prevent unacceptable levels of pest damage by the most economical means. At the same time, IPM looks at the lowest possible risk to people, property, resources, and the environment.

SCOUTING FIELD CROPS FOR PESTS

One of the keys to a successful IPM program is regular monitoring of field crop conditions and pest infestations. A scouting trip through a field reveals the pests that are present, the stage of growth each pest and crop are in, whether pests are parasitized or diseased, whether pest numbers are increasing or decreasing, and the condition of the crop. This information is useful in determining whether control measures may be needed.

Our scouting program requires accurately written records of the field location, current field conditions, a history of previous pest infestations and pesticide use, and a map locating present pest infestations. These records enable us to keep track of each field and anticipate or diagnose unusual crop conditions in subsequent years.

Insect pests can be monitored in several ways. Usually, the insects are counted, or the amount of crop injury is estimated. Methods of scouting for insects include collecting insects with a sweep net, shaking the crop foliage and counting dislodged insects, counting insects on plants, and using traps.

Plants also should be examined for symptoms of disease, and, if infected plants are found, the severity of the disease should be determined. This is reported as percent infection of whole plants, the whole field, or of key plant parts (e.g., flag leaf on wheat, the stalk on corn).

Early season weed scouting is conducted within two weeks after crop emergence to evaluate the performance of herbicides and determine whether rotary hoeing, cultivation, or postemergence herbicides are needed.

GROWTH STAGES OF FIELD CROPS

Before applying any pesticide, we determine the crop growth stage. Because some growth stages are more susceptible to pest injury than others, the economic threshold or damage threshold may not be the same at each stage. Moreover, the application of certain pesticides at the wrong time can cause crop damage. Additionally, illegal application, or an illegal amount of pesticide residue on the crop at harvest time can also cause problems.

ECONOMIC THRESHOLDS AND INJURY LEVELS

The most **common** feature of field crop IPM programs is scouting fields for pests and basing treatment decisions on economic thresholds, popularly referred to as "action thresholds." The economic threshold (ET) is the pest density at which some control should be performed to prevent a pest population from increasing further and causing an economic loss.

Because pathogens are too small to be seen without a microscope, counting is not considered practical; therefore, an estimate is made of the amount of injury caused by a pathogen. For plant diseases, *damage thresholds* are used to help make treatment decisions. The damage threshold is the maximum damage a crop can sustain without yield loss.

An economic threshold for weeds is the density of weeds at which control is economically justified because of the potential for yield reduction, quality loss, or harvesting difficulties. Weed densities that lower yields by more than 10 percent are generally above the economic threshold.

Another level of pests frequently referred to in pest management programs is the *economic injury level* (EIL): the lowest pest density at which economic damage occurs. Another way of interpreting the EIL is to think of it as the level at which the cost of the control measure is equal to the loss likely to be caused by the pest.

After determining the potential benefits of a pesticide application, one also should begin to identify some risks that may be linked to the use of a given product. An analysis of the benefits and risks of a pesticide treatment leads to the formulation of the benefit/risk ratio.

INSECTS

The main control measure for insects are seed treatments and the use of hybrids with genetic traits that control problem pests. Fortunately crop-damaging insects that inhabit cultivated crops and rarely, if ever, reach densities sufficient to cause economic injury so application of pesticides is rarely warranted.

WEEDS

Weeds interfere with crop growth by competing for moisture, nutrients, light, and space. They also may affect crop quality, cause harvesting difficulties, or serve as an alternate host for certain

insects and plant diseases. In most situations, some type of weed management is usually necessary for optimum crop yield.

Using a combination of weed management options, such as tillage, mowing, crop rotation, mulching, cover crops, biological control, and herbicides, usually is more effective than relying on a single practice.

Economic thresholds are not widely used in planning a weed-control program. Our weed-control system included the use of preplant or preemergence herbicides preventive in nature and applied before the weeds germinate and emerge. Followed with the use of postemergence herbicides and treat only those fields where weed populations exceed an economically damaging level.

A second limitation is that most economic threshold programs do not address weed seed production. If a new weed problem is just beginning on a farm, it may not be appropriate to rely solely on economic threshold data.

If no control measures are used, most fields will likely develop significant weed populations. Economic thresholds for weeds may be most useful after some form of primary weed control has been applied. We then decide whether the level of weed control in a given field is acceptable or whether additional weed management practices are economically justified.

PLANT DISEASES

Currently plant disease management consist of the treatment of the seed to control soil borne fungal pathogens. If a disease is detected while scouting proper IPM practices are used to determine if a control measure is needed.

Management of plant disease problems in field crops relies on several factors. The first is a working knowledge of common and unusual diseases in your region. Second is the proper identification of the disease based on signs, symptoms, and field distribution patterns, as well as assessing the severity of the disease. Finally, familiarity with the damage threshold for a given disease is necessary so management decisions can be made before the economic injury level is reached.

IPM: MORE THAN JUST SCOUTING

Integrated pest management is far more complex than just scouting fields for pests, having knowledge of economic thresholds, and using pesticides in a judicious fashion. A well-designed IPM program should integrate several management strategies while maintaining agricultural profitability and environmental quality. Effective pest management programs should anticipate potential pest problems and attempt to modify existing crop production practices if they continually lead to pest outbreaks, yield losses, and overuse of pesticides. This objective is most

often accomplished by blending pest-control tactics together. The tools of pest management programs may include cultural, mechanical, physical, biological, genetic, regulatory, and chemical controls. The integration of many strategies increases successful pest control. Some of the most common tactics used in field crop pest management programs include:

- proper identification of the pest,
- use of pest-resistant crop varieties,
- crop rotation,
- change in tillage practices,
- variation of planting and harvest times,
- proper soil fertilization,
- proper sanitation,
- effective water-management programs,