AGRI MAGAZINE
(International E-Magazine for Agricultural Articles)
Volume: 03, Issue: 01 (January, 2026)
Available online at http://www.agrimagazine.in
©Agri Magazine, ISSN: 3048-8656

Impact of Pesticide Residue in Fodder on Dairy Animal Health

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Pesticide residues in fodder pose a serious threat to the health and productivity of dairy animals. Exposure occurs through feeding of contaminated green fodder, crop residues and grazing in recently sprayed fields. Intake of such residues may lead to nervous, digestive and reproductive disorders, resulting in reduced milk yield, abortions and post-parturient complications. The article discusses major sources, clinical signs, diagnosis, management and preventive measures of pesticide toxicity in dairy animals, with emphasis on safe pesticide use, proper fodder management and adoption of eco-friendly farming practices to safeguard animal and public health.

Introduction

Pesticides are widely used in modern agriculture to protect crops from pests and diseases and to improve crop productivity. However, the increasing and often indiscriminate use of these chemicals has led to the presence of pesticide residues in agricultural produce, including green fodder and crop residues fed to dairy animals. These residues may remain in fodder even after harvesting and can enter the animal body through regular feeding. Dairy animals such as cattle, buffaloes, goats and sheep are frequently exposed to pesticide residues through contaminated fodder, grazing in recently sprayed fields and feeding on crop by-products. Continuous or accidental consumption of such contaminated feed may adversely affect animal health, leading to reduced productivity, reproductive problems and increased susceptibility to diseases. In severe cases, pesticide exposure may result in poisoning and mortality. Since crop production and animal husbandry are closely linked, the issue of pesticide residues in fodder has become an important concern for livestock farmers. Understanding the impact of these residues on dairy animal health and adopting appropriate preventive measures are essential to ensure animal welfare, improve farm productivity and reduce economic losses.

Pesticide Residues and Their Entry into Fodder

Pesticide residues are the traces of chemical substances that remain on fodder crops after the application of pesticides during cultivation. These residues may persist in green fodder, straw, hay and crop by-products even after harvesting, drying or storage. Dairy animals are commonly exposed to such residues while grazing in recently sprayed fields or through feeding of contaminated fodder and agricultural waste. Continuous intake of pesticide-contaminated fodder can lead to gradual accumulation of toxic substances in the animal body, resulting in adverse effects on health, productivity and reproduction. In severe cases, pesticide residues may cause poisoning and even mortality in dairy animals.

Types of Pesticides, Their Effects on Animals and Common Examples

Type of Pesticide	Effects on Dairy Animals	Commonly Used Examples
Organophosphates	Nervous system stimulation, excessive salivation, tremors, difficulty in breathing, weakness	Chlorpyrifos, Malathion, Dimethoate

Type of Pesticide	Effects on Dairy Animals	Commonly Used Examples
Carbamates	Muscle twitching, incoordination, digestive disturbances, reduced feed intake	Carbaryl, Carbofuran
Pyrethroids	Tremors, restlessness, abnormal movements, hypersensitivity	Cypermethrin, Deltamethrin
Organochlorines	Accumulation in body fat, reproductive disorders, nervous signs, chronic toxicity	Endosulfan, DDT (restricted/banned)
Herbicides	Digestive upset, liver stress, reduced appetite and productivity	Glyphosate, Paraquat
Fungicides	Reduced immunity, liver damage, long-term health effects	Mancozeb, Carbendazim

Sources of Pesticide Residues

Pesticide residues in fodder mainly originate from the use of chemical pesticides during crop cultivation. Feeding of green fodder and crop residues from recently sprayed fields is a common source of exposure in dairy animals. Grazing in treated fields, use of straw and hay prepared from pesticide-treated crops, and feeding of vegetable waste collected from markets also contribute to residue intake. In addition, improper storage of pesticides near fodder and environmental contamination of soil and water due to repeated pesticide use may indirectly increase pesticide residues in animal feed.

Effects of Pesticide Residues in Dairy Animals

Pesticide residues present in fodder can have harmful effects on the health and productivity of dairy animals. Intake of contaminated feed may interfere with the normal functioning of the nervous system, resulting in signs such as excessive salivation, tremors, incoordination and weakness. Digestive disturbances including diarrhoea, reduced feed intake and loss of body condition are also commonly observed.Prolonged exposure to pesticide residues may adversely affect vital organs such as the liver and kidneys, leading to reduced metabolism, lowered immunity and poor overall health. Reproductive performance is particularly affected, resulting in problems such as irregular estrus, abortions, retained placenta and birth of weak offspring. In lactating animals, pesticide exposure may cause a decline in milk yield and quality. At the Veterinary Clinical Complex, Pantnagar, a considerable number of cases related to abortion, pregnancy-associated disorders and post-parturient complications are routinely reported. Field history in many of these cases indicates exposure to pesticide-contaminated fodder, along with poor nutritional management, as important contributing factors. Although multiple causes may be involved, pesticide residues combined with nutritional deficiencies appear to play a significant role in such reproductive and post-parturient health problems. In severe or sudden exposure, pesticide residues may lead to acute poisoning, respiratory failure and even mortality, emphasizing the need for preventive management practices.

Risk of Pesticide Residue To Human Health

Pesticide residues present in crops and fodder not only affect animal health but may also pose risks to people consuming animal products such as milk, meat and meat products. When dairy animals continuously consume pesticide-contaminated fodder, small amounts of these chemicals may accumulate in their body tissues and secretions. Some pesticides, particularly persistent ones, can pass into milk and fat, thereby entering the human food chain. Long-term consumption of animal products containing pesticide residues may have adverse effects on human health, including disturbances in the nervous system, hormonal imbalance and reduced immunity. Pregnant women and children are considered more vulnerable to the harmful effects of chronic exposure. Although residue levels are usually low, continuous intake over time may increase health risks. Therefore, controlling pesticide residues in fodder and ensuring safe feeding practices are essential not only for protecting dairy animal health but also for safeguarding public health. Adoption of judicious pesticide use, proper waiting

periods and regular monitoring of animal products can help minimize the risk of pesticide residues reaching consumers.

Clinical Signs of Pesticide Toxicity in Dairy Animals

clinical signs of pesticide toxicity in dairy animals vary depending on the type of pesticide, level of exposure and duration of intake. Common signs include excessive salivation and frothing from the mouth, tremors, muscle twitching and convulsions due to nervous system involvement. Affected animals may show in-coordination, weakness and difficulty in standing or walking. Digestive disturbances such as reduced feed intake, diarrhoea and sudden drop in milk yield are frequently observed. Respiratory distress, restlessness, dullness and progressive loss of body condition may also occur. In pregnant animals, pesticide toxicity can result in abortions, premature calving or birth of weak offspring. In severe cases or following acute exposure, animals may collapse suddenly and die due to respiratory failure or severe nervous system effects.

Diagnosis and Management of Pesticide Toxicity

Diagnosis of pesticide toxicity in dairy animals is mainly based on a detailed history and clinical examination. Information regarding recent pesticide spraying in nearby fields, feeding of freshly harvested fodder, grazing in treated areas or use of vegetable waste is important for diagnosis. Sudden appearance of similar clinical signs in more than one animal often suggests pesticide exposure. Laboratory confirmation may support diagnosis but is not always feasible under field conditions. Management of pesticide toxicity involves immediate withdrawal of suspected contaminated fodder and prevention of further exposure. Affected animals should be moved to a clean, well-ventilated area and veterinary assistance should be sought as early as possible. In emergency situations, certain commonly available household measures may be used as first aid only until veterinary help arrives. Administration of activated charcoal, where available, can help reduce absorption of toxins from the digestive tract. Feeding of plenty of clean water and soft feed may help dilute the toxic effects. Milk or oral rehydration fluids are sometimes used by farmers to soothe the digestive tract, although these do not act as true antidotes. Specific antidotes such as atropine and other drugs are required in many pesticide poisoning cases and should be administered only by a veterinarian. Supportive treatment, including fluid therapy and control of nervous and respiratory signs, plays an important role in recovery. It is important to note that household measures are not a substitute for veterinary treatment, and early professional intervention is essential to prevent serious complications and mortality.

Role of Organic and Eco-Friendly Farming Practices

Adoption of organic and eco-friendly farming practices can significantly reduce the problem of pesticide residues in fodder and protect dairy animal health. Organic farming emphasizes minimal or no use of synthetic chemical pesticides and encourages the use of biological control methods, crop rotation and resistant crop varieties. Such practices lower the chances of harmful chemical residues entering the fodder chain.

Use of botanical pesticides, bio-pesticides and natural pest control agents helps manage crop pests without leaving toxic residues on fodder crops. Maintaining soil health through organic manures, compost and green manuring improves plant resistance to pests and reduces the need for chemical sprays. Timely intercultural operations and mechanical weed control also play an important role in minimizing pesticide use. Integrated farming systems that combine crop production with livestock rearing promote safer recycling of farm resources and reduce dependence on chemical inputs. Encouraging organic and sustainable agricultural practices not only safeguards dairy animal health but also improves the quality of animal products and supports long-term environmental and human health. Awareness and gradual adoption of such practices can help farmers reduce pesticide-related risks in a sustainable manner.

Conclusion

Pesticide residues in fodder pose a serious risk to the health and productivity of dairy animals and may also affect the safety of animal products consumed by humans. Continuous or accidental exposure to contaminated feed can lead to nervous, digestive and reproductive problems, resulting in economic losses to farmers. Most cases of pesticide toxicity can be prevented through judicious use of pesticides, adherence to recommended waiting periods and safe fodder management practices. Early recognition of clinical signs and timely veterinary intervention play a crucial role in reducing the severity of toxicity. Therefore, creating awareness among farmers about the harmful effects of pesticide residues and promoting safe agricultural practices are essential for protecting animal health and ensuring safe livestock production.

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