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INTEGRATED FARMING SYSTEMS: SCOPE, SUSTAINABILITY AND IMPORTANCE

Vishal Sharma[2], Neha Yadav[1], Narender Singh[2], Man Singh[2]and Sandeep Dhillod[2]

[1] M.V.Sc Scholar [2] Assistant Professor
Department of Livestock Production Management,
LalaLajpatRai University of Veterinary and animal Sciences, Hisar, Haryana

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FARMING SYSTEM

Farming system is a resource management strategy to achieve economic and sustained agricultural production to meet diverse requirements of farm livelihood while preserving resource base and maintaining a high level of environment quality. (Lal and Miller, 1990)

It interacts adequately with environment without dislocating the ecological and socio-economic balance on one hand and attempt to meet the national goal on the other.

In its real sense, it will help in lifting the economy of agriculture, livestock and standard of living of the farmers of the country as a whole.

It is a mix of farm enterprises to which farm families allocate its resources in order to efficiently utilize the existing enterprises for increasing the productivity and profitability of the farm. These farm enterprises are crop, livestock, aquaculture, agro-forestry and agri-horticulture. (Sharma et al., 1991)

INTEGRATED FARMING SYSTEM

Integrated Farming System (IFS): A component of FSR (Farming System research), introduces a change in the farming techniques for maximum production in the cropping pattern and takes care of optimal utilization of resources.

IFS as a mixed animal crop system where the animal component is often raised on agricultural waste products while the animal is used to cultivate the soil and provide manure to be used as fertilizer and fuel.

CONCEPTS AND COMPONENTS OF IFS

"There is no waste", and "waste is only a misplaced resource which can become a valuable material for another product" in IFS. (FAO, 1977)

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IFS is a mixed farming system that consists of at least two separate but logically interdependent parts of a crop and livestock enterprises. (Okigbo,1995)

According to this concept, integration usually occurs when outputs (usually by products) of one enterprise are used as inputs by another within the context of the farming system.

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FACTORS AFFECTING INTEGRATION OF FARM ENTERPRISE

1. Soil and climatic features of the selected area.

2. Availability of resources, land, labor and capital.

3. Present level of utilization of resources.

4. Economics of proposed integrated farming system.

5. Managerial skill of the farmer

TYPES OF INTEGRATED FARMING SYSTEM

Crop-livestock farming system

Crop-livestock-fishery farming system

Crop-livestock-fishery farming system

Crop-poultry-fishery-mushroom farming system

Crop-livestock-fishery-vermicomposting

Agri- horticulture- silviculture-pastoral system

ADVANTAGES OF IFS

- IFS is a multidisciplinary whole farm approach and very effective in solving the problems of small and marginal farmers.
- The approach aims at increasing income and employment from small-holding by integrating various farm enterprises and recycling crop residues and by products within the farm itself (Behra and Mahapatra 1999, Singh et al. 2006).
- . Increased productivity, profitability and sustainability are ensured with protective food and environmental safety. Recycling of waste material, income round the year,

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saving energy, meeting fodder crisis, employment generation and ultimately increasing the standard of living of the farmers are other major benefits of integrated farming system (Faroda 2014).

Profitability: Use waste material of one component at the least cost. Thus, reduction of cost of production and form the linkage of utilization of waste material, elimination of middleman interference in most input used. Working out net profit B/ C ratio is increased.

Potentiality or Sustainability: Organic supplementation through effective utilization of by-products of linked component is done thus providing an opportunity to sustain the potentiality of production base for much longer periods

Balanced Food: We link components of varied nature enabling to produce different sources of nutrition.

Environmental Safety: In IFFS waste materials are effectively recycled by linking appropriate components, thus minimize environment pollution.

Recycling: Effective recycling of waste material in IFFS.

Income Rounds the year: Due to interaction of enterprises with crops, eggs, milk, mushroom, honey, cocoons silkworm. Provides flow of money to the farmer round the year

GOALS OF IFS

The goals of integrated farming systems (IFS) are to:

• To provide a steady and stable income and rejuvenation/ amelioration of the system's productivity.

• To achieve agro-ecological equilibrium through the reduction in the build-up of pests and diseases, through natural cropping system management and the reduction in the use of chemicals (in-organic fertilizers and pesticides).

• To provide environmentally sustainable and economically viable technology that encompasses rational utilization of available resources of the region.

• To conserve natural resource base, protect the environment and enhance prosperity for a longer period of time.

SCOPE FOR IFS

An IFS consists of a range of resource-saving practices that aim to achieve acceptable profits and high and sustained production levels, while minimizing the negative effects of intensive farming and preserving the environment (Lal and Miller 1990, Gupta et al. 2012).

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IFS give greater importance for sound management of farm resources to enhance the farm productivity and reduce the environmental degradation, year (Kumar et al. 2015) improve the living standard of resource poor farmers and maintain sustainability (Kumar et al. 2013)

Integrated farming is a system which tries to imitate the nature's principle, where not only crops but, varied types of plants, animals, birds, fish and other aquatic flora and fauna are utilized for production throughout the

Integration of livestock with crops on watershed and individual holding basis has been reported to improve the traditional farming system on sustainable and eco-friendly basis (Dhiman et al. 2003).

SUSTAINABILITY OF IFS

Sustainable development in agriculture must include integrated farming system (IFS) with efficient soil, water crop and pest management practices, which are environmentally friendly, and cost effective (Walia and Kaur 2013)

Nutrient recycling within the system advocates the self-sustainability of the system and which will not only reduce the dependency on the external inputs viz, seed/ fertilizers etc. but also provide the balanced and rich nutrition to the farm family with reduced cost of cultivation and increased profit margin on the same piece of land which is key factor for taking care of sustainability

On any farm, four natural ecosystem processes like energy flow, water cycle, mineral cycle and ecosystem dynamics work (Sullivan 2003). These four ecosystems processes function together, complementing each other as sustainable agriculture requires system approach (Singh et al. 2009) and system implies a set of agricultural activities organized while preserving land productivity and environmental quality and maintaining a desired level of biological diversity and ecological stability.

ECONOMIC IMPORTANCE

In general, IFS enable the agricultural production system sustainable, profitable (3-6 fold) and productive on long term.

About 90-95% of nutritional requirement is self-sustained through resource recycling which curtails the cost of cultivation and increases profit margins and employment.

Integrated farming system enhances the net return, generates employment, conserves natural resources, reduces the cost of production and increases the overall income by minimizing risk.

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Hence, in the present scenario of agriculture sector, integrated farming system is the only approach that can enable the Indian farmers self-sufficient and competitive in the global market by producing quality edible products on account of recycling the by-products of different enterprises.

LIMITATION OF IFS

The need to provide for some measure of food security.The need to use the resources of soils, climate, etc. to provide employment and economic activity. The need to increase inland fish production, given the water resources available and static world fish output and that the rapidly developing sub-sectors of the economy (e.g. tourism) are not only fragile but can ultimately be self-destructive if not carefully handled and also dramatically increase food importation. With the new world trade situation of reduced farm and export subsidies, the cost of imported food (and feed) is rising. Developed, "modern" agriculture is not necessarily energy-efficient agriculture. The lack of animal feed throughout the year and unavailability of labour in needy times are the major production constraints in IFS. Resource-poor farmers are not able to invest more capital as initial investment as a constraint since there is need of immediate economic returns to meet their food requirements, schools, medical treatments and loan- repayment. The high start-up costs may constrain farmers from switching to integrated farming and from exploiting the benefits of resource integration. Procuring the improved breeds of livestock, timely availability of fish seed and feed, low cost energy efficient pumping machine, information on government schemes and credit support from financial institutions.Lack of scientific knowledge on rearing of animals, unavailability of improved breeds in the local markets and lack of financial support respectively.

FUTURE THRUST

• Creation of database on IFS throughout the country in relation to type and size of integrated farming systems, enterprise selected and their way of allocation, infrastructure, economics, economic sustainability of the system etc. under different ecological situations

• Development of ecologically stable, environmentally sound and location specific low-cost viable IFS modules for different holding sizes which are socially acceptable is required.

• On –farm testing and refinement of the developed modules according to the farmers' need and requirement as it is a continuous process i.e. addition of profitable components and replacement of less profitable components with time, choice of the farmers and availability of market.

• Need to study the sustainability of the developed or identified farming systems under different agro- climatic situations in the long run including high value crops.

• Need to study the nutrient dynamics of soil, accumulation of carbon and carbon sequestration with continuous cropping and recycling of organic resources in form of plant or

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animal wastes with different systems over time. • Need to identify the constraints in adoption of identified integrated farming systems for particular area or locality.

RESEARCH OUTCOME

Kumar et al. (2011) emphasized that the wastes/ by-products of crop/animals used as input for another component has increased the nutrient efficiency at the farm level through nutrient recycling.

Addition of organic residues into the system in the form of recycled animal and plant wastes could also help in improving the soil–health and thereby productivity over a longer period of time with lesser environmental hazards (Gill et al. 2009b, Kumar et al. 2017)

Integration of livestock with crops on watershed and individual holding basis has been reported to improve the traditional farming system on sustainable and eco-friendly basis (Dhiman et al. 2003)

In Haryana, Sheokand et al. (2000) conducted studies of various farming systems on 1 ha of irrigated and 1.5 ha of unirrigated land and found that under irrigated conditions of mixed farming with crossbred cows yielded the highest net profit (Rs 20581) followed by mixed farming with buffaloes (Rs 6218) and lowest in arable farming (Rs4615)

CONCLUSION

Farming system models at different situations could enhance the productivity of the farm as whole, improve the profitability in terms of additional net return and continuous flow of income to the farmer and sustain the soil health through residue addition and improve the major and micro nutrient supply.

In integrated crop livestock farming system, crop residues can be used for animal feed, while manure from livestock can enhance agricultural productivity by intensifying nutrients that improve soil fertility as well as reducing the use of chemical fertilizers (Gupta et al. 2012).

The enterprise linkage provides good opportunity for regular and gainful on-farm employment for farm employment for farm family members with equi-temporal distribution.

This also helps for nutrition security through optimised carbohydrate, protein, fat and energy supply by integrating allied enterprises (Jayanthi and Vennila,2008)

Animal excreta contain several nutrients (including nitrogen, phosphorus and potassium) and organic matter, which are important for maintaining the soil structure and fertility.

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