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Doubling farmer's income through dairy way in Bihar (India)

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Abstract
A 60 days feeding trial was performed to assess the effects of fenugreek (*Trigonella foenum-graecum*) on the growth performance, haematological and immunological response in Nile tilapia (*Oreochromis niloticus*) fry. Five diets incorporating fenugreek diet at 0, 0.5, 1, 1.5 and 2% were prepared. The results showed that fenugreek diet in feed led to significantly ($p<0.05$) improved survival, weight gain and feed efficiency for treated groups over the control. Dietary fenugreek significantly ($p<0.05$) increased erythrocytes, leucocytes, haematocrit, haemoglobin in treated fish. Significantly higher ($p<0.05$) serum protein, albumin and globulin levels were observed in treated groups over the control. In conclusion, the impact of fenugreek has shown effective therapeutic results to consider incorporating this plant in fish feed. Also it was possible to meet the dietary fenugreek requirement of tilapia that was estimated to be 0.98 g/kg and 0.99 on the basis of maximum weight gain and protein efficiency ratio respectively.

Keywords: fenugreek, hematological, *O. niloticus*, serum

Introduction
Herb or spices have reported to promote various functions like growth, appetite stimulation, anti-stress, immune functions [1], skin coloration [2], egg-hatching rates haematological and biochemical status [2] and also increase disease resistance [3] in fish culture due to different active components. Fenugreek (*Trigonella foenum graecum*) is an annual herb of the leguminoseae family. Its seeds are used a spice and its leaves are used as a vegetable which is rich in vitamins and minerals. The seeds are protein rich; it is also an important source of diosgenin [4]. Fenugreek is rich in flavonoids (such as apigenin, kaempferol and quercetin) and saponins (such as diosgenin and yamogenin). Their characteristic functions are to protect the oxidative damage and immunostimulatory properties [5].
Therefore, this study was conducted to evaluate the effects of fenugreek seed as a feed additive in fish diets and its impact on the growth performance, blood haematological and immune parameters and survival of Nile tilapia (*Oreochromis niloticus*) fry.

Materials and methods
Experimental fish
India's agricultural challenges presently revolves around doubling the farmer's income in next five years. It certainly involves gigantic effort and requires acceleration of the annual growth rate of 10.5 percent. For meeting this challenge successfully, sincere and scientific approach for increasing productivity, ensuring sustainability, enhancing profitability of the farmers is the need of the hour. Identified measures include improvement in crop and livestock productivity, resource use efficiency, increased intensity of cultivation, diversification in high value cash crops and animal products. Focus on allied farm activities, like fruit and vegetable cultivation and processing, value adding, agro forestry, fisheries, poultry, beekeeping, livestock production, reduction in port harvest losses and adoption of efficient port harvest technology will go long way.
Dairy has always been pivotal point in Indian Economy. The agri-sector contributes significantly to the Indian Economy accounting for 17-18 percent of India's national GDP and 50 percent of the total workforce. Dairy farming is a vital component of the integrated Indian

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Farming System and structure with strong synergy between crop and livestock sector in the national GDP is 4.5 percent and in agricultural GDP 25.8 percent. The output from livestock sector, milk occupies the prime position by having share of 67 percent. Dairy sector is expected to maintain 15 percent compounded annual growth in coming years and attain the value of 9.4 trillion.

Dairy in Bihar State

In Bihar state, Dairy Sector is strong and is an important source of income and employment. It has immensely contributed in uplifting the economic status of the small holder dairy producers, who constitutes 92 percent of the farmers. In the state, dairy sector is growing at a pace rate of around 8 percent per annum, which is almost double the rate of growth in agriculture sector. Milk production in India and per capita of milk availability in 2016-2017 was 165.4 million tonnes and 355 gms per day respectively, whereas in Bihar, it was 8711 thousand tonnes and 228 gms per day respectively. In recent years, emphasis is being given in boosting this sector through multipronged approach. As per 19th Livestock census, there are 88 million In-Milk animals. Dairying has become an important secondary source of income for millions of rural families and has assumed the most important role in providing employment and income generating opportunities particularly for marginal and women farmers. Most of the milk is produced by animals reared by small, marginal farmers and landless labours. Of the total milk production in India, about 48 % milk is either consumed at the producer level or sold to non-producers in the rural area. The balance 52 % of the milk is marketable surplus available for sale to consumers in urban areas. Out of marketable surplus it is estimated that about 40 % of the milk sold is handled by the organized sector (i.e. 20% each by C-operative & Private Dairies) and the remaining 60 % by the unorganized sector. The milk production in Bihar State has increased over the year. The data presented in table 1 gives the milk production in the state in thousand tonnes over the year since 2001-02.

Table 1: Milk Production in Bihar ('000 tonnes)

2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
2664	2869	3180	4743	5060	5451	5783	5934
2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16`	2016-17
6124	6517	6643	6844	7197	7775	8288	8711

Table 2: Per capita avaibility of milk in Bihar (Grams/day)

2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
88	92	100	147	154	163	170	172
2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16`	2016-17
175	184	175	188	195	208	219	228

Value adding and processing of milk

Dairy processing industry holds the key of farmers prosperity in Bihar state. It not only provides livelihood to moillions of farmers, ensures supply of quality milk and milk product to people in both urban and rural areas. Adding value to dairy products, from simple dahi to highly industrialized yoghurts. Cheese and powders are need of hours. Dairy products have vast market and the demand is multiplying. The setting up processing plants in dairy sector will highly increase the profitability in the dairy enterprise and provide employment to the skilled rural youth. The milk produced by the Bihar farmers needs to be collected at point of production and transported to scientific storage system at the processing plant. An effective cold storage chain will facilitate it and help in maximizing profit with minimum input and risk.

The product basket of these dairy processing plant should contain variety of products which is in high demand in market on national and international level. The product range may include Dahi and fermented products, paneer, ghee, khoa, chhenna and various products made from them (ice cream, kulfi and frozen products), other value added dairy products. There is a potential of approx 20-30 percent growth of value added dairy products in the next few years like cheese, whey products, dried milk products and nutritional supplements based on milk.

Milk routine concentrate powders contains 40 to 90 % protine and presentaly in high demand. However scientific information pertaining to production of improved functionalities milk protines concentrate 60 from buffalo milk is scare. The need is to standarized the production process of improved functionality buffalo milk protine concentrate 60 powders with the addition of estabilizing solt. The process as already been published and available with ICAR National Dairy Research Institute Carnal and the new generation valued added product can be produced in Bihar on commercial scale.

Dairy Cooperative Role

Dairy cooperatives play a significant role not and improving the income of dairy producers but they also have a tremendous bearing on milk productivity through providing better facilities for qualities, storage, marketing, processing, product innovations and other related services for the dairy farmers. Dairy cooperative system has facilitated milk production and marketing in Bihar in past. Cooperatives are transferring in large share of benefits to the member of procedure where as there is evident that shows that producer share in consumer Rs. as low as 17% in backward reasons where the organized milk market are virtually non-existent and dominated by the profited seeking motives of the intermediaries. These facts clearly established the possetives contribution and impacts of dairy cooperative. They helping establishment of value change and there effective functioning which in hance the efficacy and efficience of dairy. Comphed in Bihar is a success story which may be replicated in the Dairy sector in large scale which will be helpful in transferring more than 50% of the procedure share in consumer Rs. and playing a vitol role in empowering of the women and other section of the society. Women can become the engine of growth of the cooperative sector through small scale and medium scale Dairy units in household. The biggest advantages of the cooperative sector that it vests in control with farmers and common peep.

In Bihar about 16.6 million farmers have been brought under the ambit of about 1, 85,903 village level Dairy Corporative Societies (DCS) up to March 2018. Despite the slump in world market and better procurement prices by dairy cooperatives along with decrease in procurement volume by major private players led to increase in milk collection by the dairy cooperatives by about 11%. The dairy cooperatives have procured daily average of milk about 475.6 Lakh Kg per day (LKgPD) during 2017-18 as compared to 428.7 lakh kg procured during 2016-17. The sale of liquid milk reached to 349.6 Lakh Liter per day (LLPD) during 2017-18 recording a growth of 6% as compared to 331 LLPD marketed during 2016-17. Women members of the DCS are also being encouraged to assume leadership roles. As on 31.03.2018, the

total number of women in dairy cooperatives across the country was 4.9 million in 32,092 women DCS which is 29.5% of total farmers.

Doubling the milk procedures income

Increasing organization and sustained economy growth are leading to demand for high value food like fruit, vegetables, milk and milk products and eggs, meat and fish. Marginal and small farmers can obtain double higher income than that of traditional farming system by adopting appropriate agricultural dairy technology in dairy processing sector the profitibility of the dairies can be increased by the value addition and launching new dairy projects the dairy plan can affort to pay higher milk prices to farmer to only if profit margin enhanced infrastructural and processing facility should be created to increase milk handling capacity of the organized sector to at list 50% of total milk production which is at present whorry around 15% only in Bihar. Huge growth oppertunity in dairing existing aggregating 50% of the marketable surplus milk for processing and value addition for enhancing the income of the milk procedure and making milk production as a main occupation. Govt. of Bihar should come also forward to strenthen the web of processing industries and make provision in the new budget for production of products which can be marketed in domestic markets and exported.

Nutritional security

Bihar State is one of the worse sufferer on nutritional front. The problem of hidden hunger looms large. There is an urgent need for ensuring food and nutritional securities by providing better healthy nutritive healty food to the massess espacially the down trodden poor children and women. The dairy industries, besides providing livelihood to millions of farmers, also ensure supply of quality milks and milk products to people both in urban and rural areas on the consumer side, the demographics, customer needs and convenience, socio economy factors, bying power and continued evolution of market tastes defines the nature and quantuam of product to the manufactured from milk. State has the enough potentional and prospects. The chemical composition of the milk proves its superiority over the other food. Diatery intervention that promote life style changes, weight loss improvements and blood pressure are suitable for appropriate ulternative to reduce metabolic syndrone (MetS) individuals constituents in dairy such as priotein (Casine and whey proteins) fat (Saturated fatty acids, mono saturated fatty acids, poly unsaturated fatty acids and phaspolipads) laptose and minerals such as calcium also have a potential mechanisim for controling MetS.

Table 3: Chemical composition of Cow milk

Constituents	Fat	Protein	Lactose	as	Non-protein nitrogen
%	3.5 to 3.7	3.0 to 4.3	4.6 to 4.8	0.7 to 0.8	0.19 to 0.20

The setting up dairy industry requires strong will of the public and private sector. Some level of basic knowledge, skill and expertise are required which is available with ICAR institutes and state agricultural universities of Bihar. Recently, a fullfledged Animal and Livestock University has been established in the state which can help the entrepreneurs (small, medium and large scale industrialists) in acquiring the required technology for the processing and value adding of milk. Besides, National Dairy Development Institute, Karnal, Haryana has developed technologies and effective models for such industry. In Bihar, Livestock in general and dairy animals in particular, form an integral part of the culture and livelihood. In order to improve the quality of life of dairy farmers, it is essential to set up chain of dairy based industry for producing variety of milk products which will be the driving engine for the growth of the state and doubling the farmers income within the stipulated time.

Conclusion

Livestock in general, and dairy animals in particular, for an integral part of the livelihood of rural population in India. In order to improve the quality of life of dairy farmers, it is essential that adequate attention be paid to financial inputs in the area of dairy farming and value addition to dairy produces. Dairy products, particularly milm, are perishable in nature, it is essential to process the commodity as soon as it is produced in order to avoid losses. Rapid urbanisation and better rate of growth in urban areas has led to the creation of a wide gap between rural and urban areas. Rural youth are compelled to leave villages in search of productive employment. In such a situation, converting their produce into value added products and marketing them in a structured manner, thus avoiding the middle men and agents who seize most of the profits is one possible strategy to increase the income. This will help to provide not only economic independence to these farmers, but also the much-lacking self-esteem and dignity.

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