Results Framework Document (RFD)

For

National Institute of Animal Nutrition and Physiology
Bangalore

(April, 2011 to March, 2012)

Section 1:
Vision, Mission, Objectives and Functions

Vision

Enhancing production and reproductive efficiency of livestock through basic physiological and nutritional approaches for optimizing nutrient utilization.

Mission

Conducting basic and fundamental research in animal nutrition and physiology and to effectively utilize the knowledge for improving animal production and rural economy.

Objectives

1. To carry out quantitative and qualitative assessment of feed resources and to develop district-wise information system.

2. To enhance the bioavailability of macro and micro nutrients through various approaches viz., strategic supplementation, biotechnological manipulations, feed processing technologies.

3. To enhance the reproductive efficiency of livestock through physiological and nutritional interventions.

4. To develop strategies for validation of evolved technologies at user's level for production enhancement, feed quality and safety.

Functions

1. To conduct fundamental studies on basic physiological and nutritional problems related to biophysical translation of nutrients for productive functions in livestock.

2. Effectively utilizing the scientific manpower at specialized level at one place and demonstrating how nutrition and physiology principles function in practice and thereby improve rural economy through livestock feeding and management approaches.

Section 2:
Inter se Priorities among Key Objectives, Success indicators and Targets

Objectives	Weight	Actions	Success Indicators	Unit	Weight	Target /Criteria Value				
						Excellent	V. Good	Good	Fair	Poor
						100%	90%	80%	70%	60%
Improving nutrient availability and utilization in livestock by enhancing lingo-cellulose complex degradation and reducing rumen methane production	22	Cloning of feruloyl esterase enzyme gene	Developing recombinant clones for feruloyl esterase	Date	2	30.9.11	30.11.11	31.12.11	01.02.12	25.3.12
		Enhancing lignin degradation using lignolytic enzymes from aerobic fungi	Optimization of quantity of enzymes required for spray treating of straw to obtain lignin breakdown	Date	3	30.11.11	30.12.11	30.1.12	28.2.12	30.3.12
		Studies on expansin for improving degradability of lignocellular biomass	Preparing gene construct for cloning and standardization of expression of expansin from tomato and cucumber	Date	2	1.3.12	7.3.12	14.3.12	21.3.12	31.3.12
		Identification genes with lignin/polyphenol degradaion activity through reparation and screening of metagenomic libraries	Number of genes identified to be having lignin /polyphenol degradaion activity	Number	3	5	4	3	2	1

		Estimation of methane production/suppression potential of plants /ruminants feeds	Number of plants / feed samples screened	Number	3	25	20	15	10	5
		Identification of methanogenic archea	Number of characterized, viable archea	Number	3	5	4	3	2	1
		Determining mineral release from TMR	Completion of evaluation of mineral release with TMR feeds	Date	3	30.11.11	31.12.11	31.01.12	29.2.12	31.3.12
		Developing markers for assessing copper status	Identification of copper related genes	Date	3	31.12.11	31.1.12	29.2.12	15.3.12	31.3.12
Enhancing animal feed safety for improved animal health and production	10	Reducing aflatoxin toxicity by use of plant products	Screening of plants for growth inhibition of aspergillus fungi	Number	2	40	30	20	10	5
		Standardization and evaluation of feed for contaminants through microscopy protocols	Evaluation of Indian fed samples by microscopy	Number	2	20	18	16	14	12
		Investigating the use of detoxified neem cake in growing lambs	Evaluation of nutrient utilization, immune status, biochemical	Date	2	29.2.12	15.3.12	20.3.12	25.3.12	31.3.12

			profile growth rate and carcass characteristic							
		Monitoring of heavy metals in soil, water, and feed collected near highways	Data on heavy metals contents in soil, water, and feed collected near highways	Date	2	1.3.12	7.3.12	14.3.12	21.3.12	28.3.12
		Amelioration of fluorosis toxicity using boron as a supplement	Evaluation of effectiveness of boron in amelioration of fluorosis in rat model	Date	2	01.3.12	07.3.12	14.03.12	21.03.12	31.03.12
Enhancing productive and reproductive efficiency in livestock through physiological, ,biotechnolo-gical and nutritional approaches	25	Evaluation of sperm and semen characteristics to relate to bull's fertility status	Drawing relationship between semen/sperm characteristics and fertility	Date	3	1.3.12	7.3.12	14.3.12	21.3.12	28.3.12
		Modulation of corpus luteum PGF2α production by use of modulators to enhance function	Number of modulators tested *in vitro*	Number	2	3	2	1	0	0
		Understanding the regulation of CL by studying expression of genes associated with CL function	Number of genes studied for expression	Number	3	5	4	3	2	1

		Elucidating mechanism of growth dynamics of ovarian follicles in the buffalo	Identification of factors involved and markers of growth and apoptosis	Date	3	1.3.12	7.3.12	14.3.12	21.3.12	28.3.12
		Supplementation of energy for augmenting attainment of puberty in the buffalo	Evaluation of usefulness of energy supplement in augmenting attainment of puberty	Date	2	30.6.11	30.7.11	30.8.11	30.9.11	30.10.11
		Study the effect of dietary energy on endocrine, immune and reproductive response in sheep	Standardization of expression analysis of genes involved	Date	2	31.1.12	15.2.12	28.2.12	15.3.12	31.3.12
		Investigating the effects of azolla supplementation on reproductive functions	Data acquisition, on ovarian follicle activity, estrus and ovulation and biochemical parameters in buffalo heifers analysis and inference	Date	2	30.11.11	10.12.11	15.12.11	20.12.11	25.12.11
		Identification of candidate molecule for early pregnancy diagnosis in buffaloes	Bioinformatic analysis for characterization of partial cDNA sequence of buffalo	Date	3	1.3.12	7.3.12	14.3.12	21.3.12	30.3.12

			reproductive tract, submission to data bank and getting accession number of each gene							
		Elucidating antioxidant mechanism during estrous cycle and early pregnancy in buffaloes	Detection of dynamics of antioxidant enzymes in buffalo oviduct and uterine luminal fluid	Date	3	1.3.12	7.3.12	14.3.12	21.3.12	30.3.12
		Examination of action of ammonia on granulosa cells and oocyte activity/growth	Effect of ammonia on growth and secretory activity of granulose cells	Date	2	20.02.12	28.02.12	10.03.12	20.03.12	25.03.12
Enhancing egg production and egg quality through physiologi-cal and manageme-ntal approaches	6	Production of designer eggs with low cholesterol/lipid levels	Eggs with low cholesterol/lipid content	Date	2	30.11.11	31.12.11	31.1.12	29.2.12	31.3.12
		Dissemination of light as managemental tool for increasing egg production	Demonstration of the tool in the field in a poultry farm for the benefit of farmer	Date	2	30.6.11	31.7.11	31.8.11	30.9.11	31.10.11
		Elucidation of mechanism of biophysical	Establishment of relationship between	Date	2	30.11.11	31.12.11	31.1.12	29.2.12	31.3.12

		translation of calcium to enable its modulation to improve egg shell quality	calcium uptake, carbonic anhydrase activity, shell quality and role of shell proteins during production, post molt production periods and formation of egg shell							
Feed resources, feed supplements / feed additives for improving nutritional status of animals	6	Study the influence of prebiotic feeding on rumen fermentation	Evaluate rumen metabolic and microbial profiles	Date	2	30.9.11	31.10.11	30.11.11	31.12.11	31.1.12
		Preparation of chromium enriched yeast for feeding in livestock and poultry as supplement	Method for production of chromium enriched yeast	Date	2	31.10.11	30.11.11	31.12.11	31.1.12	29.2.12
		Feeding azolla as a green feed supplement for dairy animals	Evaluation of effect on milk production	Date	2	31.8.11	30.9.11	31.10.11	30.11.11	31.12.11
Amelioration of stress in animals for better production and reproduction	6	Exploring mechanism of compromised maternal recognition of pregnancy in sheep under stress	Screening of sheep for prostaglandin under heat and nutritional stress	Number	2	50	40	30	20	10

		Reducing stress to increase egg production beyond 72 weeks of age in birds	Establishing antioxidant status during the ovulatory cycle	Date	2	31.8.11	30.9.11	31.10.11	30.11.11	31.12.11
		Amelioration of heat stress in animals	Identification, assay and validation of stress indicators	Date	2	30.10.11	15.11.11	30.11.11	15.12.11	30.12.11
Development of nutritional and physiological informatics for disseminati-on of knowledge to stake holders	7	Developing Indian livestock feed portal	Amount of information on feed resources/ feeding generated	Number	2	100	75	60	50	40
		Developing feed balance sheet for livestock	Development of district level dynamic information for states of south and western India	Number of states	1	7	6	5	4	3
		Estimation of crop residues production with remote sensing technique	Precision of estimation	%	2	80	75	65	55	45
		Village workshop on nutritional, productive and reproductive management of livestock	Number of workshops conducted	Number	1	8	6	4	2	0

		Training professionals in research methodology, data management and biostatistics	Developing effective training modules and conducting training	Date	1	15.11.11	30.11.11	10.12.11	15. 1.12	25.1 .12
Bring out publications related to institute research activities & functions and presentations at scientific meetings	6	Compiling and editing of annual report	Printing and publishing of annual report of the institute for the period 2010-2011	Date	1	30.6.11	7.7.11	14.7.11	21.7.11	28.7.11
		Publication of research articles	Number of research papers submitted for publication	Number	2	37	30	25	20	10
		Preparation of brochures/ folders etc. as extension literature	Number of extension literature brought out	Number	1	5	4	3	2	1
		Participation in scientific meets and presentation of research findings	Number scientific meets participated and presentations made	Number	2	50	40	30	20	10

Building infrastructure for effective conducting of research activities	1	Construction of new laboratory block, boundary wall for security, guesthouse expansion, storm water drainage, rain water harvesting etc	Number of works completed	Number	1	4	3	2	1	0
Efficient functioning of the RFD system	11	Timely submission of RFD for 2011-12	Target date	Date	2	10.6.11	15.6.11	20.6.11	24.6.11	30.6.11
		Timely submission of results for 2011-12 RFD	Target date	Date	1	01.05.12	10.5.12	15.5.12	20.5.12	30.5.12
		Finalize a strategic plan for next five year plan	Target date	Date	2	10.12.11	15.12.11	20.12.11	24.12.11	31.12.11
		Identify potential areas of corruption related to organization activity and develop an action plan to mitigate them	Target date	Date	2	10.12.11	15.12.11	20.12.11	24.12.11	31.12.11
		Create a Sevottam compliant system to implement, monitor and review citizen's	Target date	Date	2	10.12.11	15.12.11	20.12.11	24.12.11	31.12.11

		charter								
		Create a Sevottam compliant system to redress and monitor public grievances	Target date	Date	2	10.12.11	15.12.11	20.12.11	24.12.11	31.12.11

Section 3:
Trend Values of the Success Indicators

Objectives	Actions	Success Indicators	Unit	Actual Value for FY 09/10	Actual Value for FY 10/11	Target Value for FY 11/12	Projected Value for FY 12/13	Projected Value for FY 13/14
Improving nutrient availability and utilization in livestock by enhancing lingo-cellulose complex degradation and reducing rumen methane production	Cloning of feruloyl esterase enzyme gene	Developing recombinant clones for feruloyl esterase	Date	--	--	25.03.12	--	--
	Enhancing lignin degradation using lignolytic enzymes from aerobic fungi	Optimization of quantity of enzymes required for spray treating of straw to obtain lignin breakdown	Date	--	--	30.12.11	--	--
	Studies on expansin for improving degradability of lignocellular biomass	Preparing gene construct for cloning and Standardization of expression of expansin from Tomato and cucumber	Date	--	--	07.3.12	--	--
	Identification genes with lignin/polyphenol degradaion activity through reparation and screening of metagenomic libraries	Number of genes identified to be having lignin /polyphenol degradaion activity	Number	--	--	4	--	--
	Estimation of methane production/suppression potential of plants /ruminants feeds	Number of plants / feed samples screened	Number	--	--	20	25	--

	Identification of methanogenic archea	Number of characterized, viable archea	Number	--	--	4	--	--
	Determining mineral release from TMR	Completion of evaluation of mineral release with TMR feeds	Date	--	--	31.12.11	--	--
	Developing markers for assessing copper status	Identification of copper related genes	Date	--	--	31.01.12	--	--
Enhancing animal feed safety for improved animal health and production	Reducing aflatoxin toxicity by use of plant products	Screening of number of plants for growth inhibition of aspergillus fungi	Number	--	--	30	--	--
	Standardization and evaluation of feed for contaminants through microscopy protocols	Evaluation of Indian feed samples by microscopy	Number	--	--	18	--	--
	Investigate use of detoxified neem cake in growing lambs	Evaluation of nutrient utilization, immune status, biochemical profile growth rate and carcass characteristics	Date	--	--	15.03.12	--	--
	Monitoring of heavy metals in soil, water, and feed collected near highways	Data on heavy metals contents in soil, water, and feed collected near highways	Date	--	--	07.03.12	--	--

	Amelioration of fluorosis toxicity using boron as a supplement	Evaluation of effectiveness of boron in amelioration of fluorosis in rat model	Date	--	--	7.3.12	--	--
Enhancing productive and reproductive efficiency in livestock through physiological, biotechnological and nutritional approaches	Evaluation of sperm and semen characteristics to relate to bull's fertility status.	Drawing relationship between semen/sperm characteristics and fertility	Date	--	--	7.3.12	--	--
	Modulation of CL PGF2α production by use of modulators to enhance function	Number of modulators tested in vitro	Number	--	--	2	--	--
	Understanding the regulation of CL by studying Expression of genes associated with CL function	Number genes studied for expression	Number	--	--	4	--	--
	Elucidating mechanism of growth dynamics of ovarian follicles in the buffalo	Identification of factors involved and markers of growth and apoptosis	Date	--	--	7.3.12	--	--
	Supplementation of energy for augmenting attainment of puberty in the buffalo	Evaluation of usefulness of energy supplement in augmenting attainment of puberty	Date	--	--	30.07.11	--	--

	Study the effect of dietary energy on endocrine, immune and reproductive response in sheep	Standardization of expression analysis of genes involved	Date	--	--	15.02.12	--	--
	Investigating the effects of azolla supplementation on reproductive functions	Data acquisition, on ovarian follicle activity, estrus and ovulation and biochemical parameters in buffalo heifers analysis and inference	Date	--	--	10.12.11	--	--
	Identification of candidate molecule for early pregnancy diagnosis in buffaloes	Bioinformatic analysis for characterization of partial cDNA sequence of buffalo reproductive tract, submission to data bank and getting accession number of each gene	Date	--	--	07.03.12	--	--
	Elucidating antioxidant mechanism during estrous cycle and early pregnancy in buffaloes	Detection of dynamics of antioxidant enzymes in buffalo oviduct and uterine luminal fluid	Date	--	--	07.03.12	--	--
	Examination of action of ammonia on granulosa cells and oocyte activity/growth	Effect of ammonia on growth and secretory activity of granulose cells	Date	--	--	28.02.12	--	--

Enhancing egg production and egg quality through physiological and managemental approaches	Production of designer eggs with low cholesterol/lipid levels	Eggs with low cholesterol/lipid content	Date	--	--	31.12.11	--	--
	Dissemination of light as managemental tool for increasing egg production	Demonstration of the tool in the field in a poultry farm for the benefit of farmer	date	--	--	31.07.11	--	--
	Elucidation of mechanism of biophysical translation of calcium to enable its modulation to improve egg shell quality	Establishment of relationship between calcium uptake, carbonic anhydrase activity and shell quality and the role shell proteins during production and post molt production periods and formation of egg shell	Date	--	--	31.12.11	--	--
Feed resources , feed supplements / feed additives for improving nutritional status of animals	Study the influence of prebiotic feeding on rumen fermentation	Evaluate rumen metabolic and microbial profiles	Date	--	--	31.10.11	--	--
	Preparation of chromium enriched yeast for feeding in livestock and poultry as supplement	Method for Production of chromium enriched yeast	Date	--	--	30.11.11	--	--

	Feeding azolla as a green feed supplement for dairy animals	Evaluation of effect on milk production	Date	--	--	30.09.11	--	--
Amelioration of stress in animals for better production and reproduction	Exploring mechanism of compromised maternal recognition of pregnancy in sheep under stress	Screening of sheep for prostaglandin under heat and nutritional stress	Number	--	--	40	--	--
	Reducing stress to increase egg production beyond 72 weeks of age in birds	Establishing antioxidant status during the ovulatory cycle	Date	--	--	30.09.11	--	--
	Amelioration of heat stress in animals	Identification , assay and validation of stress indicators	Date	--	--	15.11.11	--	--
Development of Nutritional and physiological informatics for dissemination of knowledge to stake holders	Developing Indian livestock feed portal	Amount of information on feed resources/feeding generated	Number	--	--	75	--	--
	Developing feed balance sheet for livestock	Development of district level dynamic information for states of south and western India	Number of states	--	--	6	2	--
	Estimation of crop residues production with remote sensing technique	Precision of estimation	%	--	--	75	--	--
	Village workshop on nutritional, productive and reproductive management of livestock	Number of workshops conducted	number	4	4	6	6	6

	Training professionals in research methodology, data management and biostatistics	Developing effective training modules and conducting training	Date	--	--	30.11.11	--	--
Bring out publications related to institute research activities & functions and presentations at scientific meetings	Compiling and editing of annual report	Printing and publishing of the annual report for the period 2010-2011	Date	--	--	07.07.11	07.07.12	--
	Publication of research articles	Number of research papers submitted for publication	Number	--	--	30	35	--
	Preparation of I brochures/ folders etc. as extension literature	Number of extension literature brought out	Number	--	--	4	6	--
	Participation in scientific meets and presentation of research findings	Number scientific meets participated and presentations made	Number	--	--	40	45	--
Building infrastructure for effective conducting of research activities	Construction of new laboratory block, boundary wall for security, guesthouse expansion, storm water drainage, rain water harvesting etc.	Number of works completed	Number	--	--	3	--	--
Efficient functioning of RFD system	Timely submission of Draft of RFD for 2011-12	Target date	Date	--	16.3.11	10.6.11	--	--
	Timely submission of Results of RFD for 2011-12	Target date	Date	--	25.3.11	01.05.12	--	--
	Finalize a strategic plan for next five year plan	Target date	Date	--	--	15.12.11	--	--

	Identify potential areas of corruption related to organization activity and develop an action plan to mitigate them	Target date	Date	--	--	15.12.11	--	--
	Create a Sevottam compliant system to implement, monitor and review citizen's charter.	Target date	Date	--	--	15.12.11	--	--
	Create a Sevottam compliant system to redress and monitor public grievances.	Target date	Date	--	--	15.12.11	--	--

Note: The target values for the year 2011-12 have been given for respective success indicators of the objectives. The same could not be given for the next years (2012-13 & 2013-14) as successive indicators for those years likely to be changed.

Section 4:
Description and Definition of Success Indicators and Proposed Measurement Methodology

Objective 1:

Cellulose complexed with lignin is not available for the animal due to lack of lignolytic enzymes in the rumen and thus that much of nutrient is wasted. Supplementation of lignolytic enzymes derived from various sources including recombinant production will increase better utilization of fiber. Suppression of methane production in the rumen by altering diet, use of methane suppressants, modulating rumen microbes (methanogens) will divert the energy wasted (as methane) to productive process in the animal and also will reduce animal's contribution to green house gas thus promoting environmental protection. Accurate and simple methods to identify nutrient deficiencies will help supplementation and overcoming such deficiencies and improve animal production.

Objective 2:

Eliminating/avoiding toxins in feed, ameliorating effects of toxins, detection and rendering feed of contaminants are essential to provide safe feed that improves health and production in animals and reduce loss to the farmer.

Objective 3:

Enhancing productive and reproductive efficiency in livestock will increase animal production and contribute to food security and also increase farmer's economy. Better understanding of basics of physiological and nutritional mechanisms and constraints of reproduction in livestock will help augment reproductive efficiency. Improving quality of semen, protecting the functionality of the corpus luteum (CL), reducing oxidative stress, modulating attainment of puberty, early detection of pregnancy, understanding and modulating follicle development/function of ovary will all help in this respect.

Objective 4:

Simple managemental and nutritional tools can help increase egg production without increase in cost of production and also reduce cholesterol/lipid content of eggs that are safer for human consumption.

Objective 5:

Prebiotics help better and improved utilization of feed and nutrient availability. Azolla with very high protein content can be a good supplement for concentrates and can improve milk production as well as reduce cost of production.

Objective 6:

Stress plays a major role in animal production system and higher stress will reduce animal production and reproduction and in turn affect the economy. Addressing the problem by identifying factors that increase stress and the factors that tend to reduce the animal's adverse response to stress will help in modulation of stress response and increase animal productivity.

Objective 7:

Collecting and developing effective methods/means of providing scientific information to the stake holders is very important for animal husbandry activity. Developing user friendly information portals, assessing feed/fodder availability, forecasting feed resource, training stake holders all are required for effective all help in this regard.

Objective 8:

Publication of findings of basic and fundamental research through publishing in scientific journals, presentations at scientific meetings, extension literature all are required for dissemination of knowledge and reflect the functioning of the unit.

Section 5:

Specific Performance Requirements from other Departments

1. Involvement of animal husbandry departments, milk federations, and other line departments in providing inputs in terms of biological materials, data and in facilitating spread of technology.

2. Unforeseen environmental circumstances – biotic and abiotic, may affect the outcome of the studies especially involving the animals.

3. Timely completion of work taken up by construction agency and materials supply for civil works

4. Timely release of required funds is essential for implementation and proper progress of the programmes.

5. Availability of human resource in terms of technical and supporting staff

Section 6:
Outcome/Impact of Organization/Ministry

S. No.	Outcome/Impact of Organization/ RCs	Jointly responsible for influencing this outcome/impact with the following organization (s) / ministry (ies)	Success indicator (s)	Unit	FY 09-10	FY 10-11	FY11-12	FY12-13	FY13-14
1	District wise information system on feed quantity and quality	**State Animal Husbandry Departments, Feed industries**	District level dynamic information on feed resources	Number	--	--	6	2	**--**
2	Improved animal productivity	**Livestock farmers, milk federations / cooperatives, animal husbandry departments, NGOs, policy makers and Feed industries**	Enhanced bioavailability of macro and micronutrients	Date	31.03.10	31.03.11	31.03.12	31.03.13	31.03.14
3	Improved reproductive efficiency of livestock	**Livestock farmers, state agricultural universities, milk federations / cooperatives, animal husbandry departments, NGOs, policy makers and sister organizations like DBT, DST, NABARD, Feed industries**	Identification of factors influencing ovarian, endometrial and sperm functions	Date	31.03.10	31.03.11	31.03.12	31.03.13	31.03.14
4	Validated technologies at user's level for production enhancement, feed quality and safety.	**Livestock farmers, state agricultural universities, milk federations / cooperatives, animal husbandry departments and NGOs**	Number of workshops conducted	Number	4	4	6	6	6

Note: The success indicator of the first outcome/impact at S. No. 1 i.e. District wise information …….quality has started from 2011-12 and will be continued until 2012-13. Hence, no value has been given for years 2009-10, 2010-11 and 2013-14.