Community Action in Integrated and Market Oriented Feed-Livestock Production in Central and South Asia

Socio-economic Component Activities

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PARC, FRI, UAF, Pakistan

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Activity Plan

1. Participatory Sites Selection
2. Sites Characterization
3. Farm Typologies and Production systems at Rainfed Site
4. Farm Typologies, Production systems and Ex-ante analysis at Irrigated Sites
5. Socio-economic assessment of feed Livestock technologies
6. Analytical framework for impact assessment (M.Sc. Thesis research for Impact Evaluation)

1

Participatory Sites Selection

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Sites Selection Process at Rainfed Site

- Livestock extension, BVDP, NRSP consulted at Rainfed Site
- Livestock extension, UAS, UAF, FRI consulted at Irrigated site
- 4 villages visited in consultation with the partners (Mohra Phul, Mohra Hayyat, Lodhay, Chak Mandri) in rainfed Gujarkhan
- Thirty five villages visited in Sargodha
- Selection criteria
  - i. Small land/ livestock holding
  - ii. Livestock comprising of milch and meat animals
  - iii. Livestock comprising of large and small ruminants
  - iv. Low earning of the farmers
  - v. Farmers willingness to adopt technologies in crop livestock system
  - vi. Willingness of women to participate in the project
  - vii. Accessibility to market
- Lodhay was selected due to the enterprising nature of the community
- Two villages Chak No. 74/SB and 105/SB selected considering enterprising and market access

2

Sites Characterization

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Village Profiles of Irrigated Sites

Characteristics	105 SB	74 SB
Distance from Market/City (km)	15	15
Village Population	2000	3500
Households (no)	250	500
Total village land (ac)	1000	1500
Small land holding (%) • landless • <2 acres • <2-10 acres • > 10 acres	 55% 3% 40% 2%	 30% 52% 11% 7%
Irrigation sources	Canal	Canal+Tw
Rainfall (mm)	<350mm	350mm

Village Profiles of Rainfed Sites

Characteristics	Lodhay
Distance from Tehsil/District (km)	15/85
Village Population	2400
Households Farm/Non-Farm (no)	220/50
Total village land (ac)	1800
Cultivated Land (ac)	1400 (77%)
Irrigated area (ac)	55 (< 1%)
Irrigation sources	26 wells
Rainfall (mm)	550-750 mm
Access to inputs/Vet./AI/medical store	3km
AI for Cow/Buff	75%/20%

Value Chain

- Milk is sold mainly in raw farm
- Milk prices varies at Irrigated site (Irri. Rs. 18 buff, Rs. 15 cow, Winter: Rs. 16-Rs. 13)
- Milk prices varies at Rainfed site (20 cow and 22-24 buff, evening milk 18-22)
- Few household practicing costly fattening for sacrificial animals
- High potentiality of low cost fattening
- Low cost fattening packages for normal/regular sale of young stock (small and large ruminants)
- Quality yoghurt making for better quality and market acceptability
- Milk preservation/longevity introduction

3

Farm Typologies, Production Systems at Rainfed Site

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Livestock production system on typical farms at Rainfed Site

Livestock	Milk	Meat	Fodder/ Seed
Total Farmers (no)	12	3	6
Farm size (ac)	24	16	20
Herd Size (no)	14	7	13+15
Buffalo (no)	4 (1d)	2 (d)	1
Cow (no)	3 (1d)	2 (1d)	2 (1 d)
Total Milking Animals (no)	7	4	3
Milk sold (kg/day)	26 (87%)	0	4
Calves (no)	4	1	2
Heifers (no)	3	2 (fat)	7B+2C+15
Area under Fodder (%)	41%	20%	50%
Farm Equipment Value (Rs. million)	0.75	.05	.09
Family Labor (no)	4	3	3

Dry matter availability in Rainfed Pothwar

	< 2 ha	2-5 ha	>5 ha	All	Non-farmer
	Dry matter availability (kg./day/animal unit)				
Dry matter (kg./day)	5.2	5.3	6.8	5.7	3.1
Dry matter required/AU	7.0	7.0	7.0	7.0	7.0
Dry matter sufficiency (%)	74	75	97	82	44

Contribution of different feed sources

	< 2 ha	2-5 ha	>5 ha	All	Non-farmer
Feed Resources	Percent of total dry matter				
Concentrates	28	18	13	21	40
Green fodder	42	49	58	48	33
Dry roughage	30	34	29	31	27
Total Dry matter (ton/year)	6.2	10.0	19.3	8.9	3.5

Contribution of livestock in total household income

	< 2 ha	2-5 ha	>5 ha	All	Non-farmer
Income Sources	(percent of total income)				
Crop income	14	24	25	21	0
Livestock income	20	29	27	23	24
Off-farm income	66	47	47	56	76

4

Typologies, Baseline Scenario and Ex-ante Analysis of Potential Impacts of Development Interventions at Irrigated Sites

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Analysis of the Development Options to improve the income Situation of Dairying Households in Punjab

Dissertation

Submitted in fulfilment of the Requirements of the Degree of Doctor of Agricultural Sciences to the Faculty of Agricultural Sciences

Georg-August-Universität Göttingen

Khalid Mahmood

Braunschweig, November 2007

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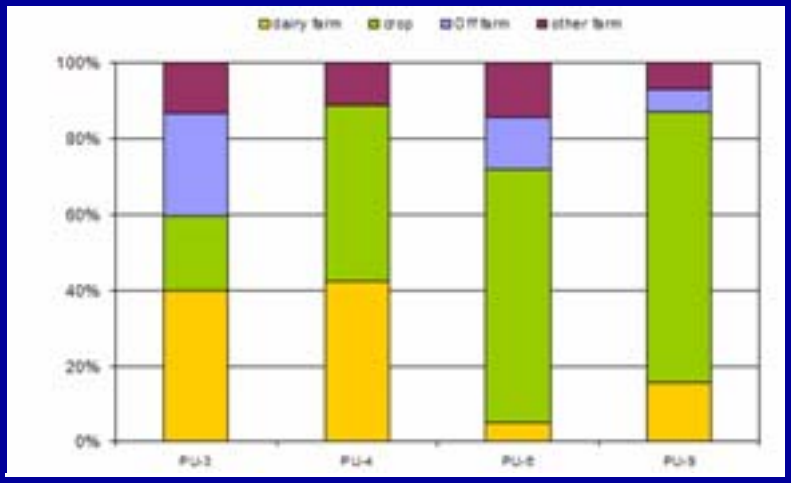
Farm Typologies and Characteristics at Irrigated Site

	TFC1 Owner operated sem-Subsistance	TFC2 Small Tennat Farmers	TFC3 Owners semi-commercial medium size farms	TFC4 Owners Large size Commercial fafrms	Probability
A. Primary Classificatory variables					
Farmers represent typologies (%)	19	14	33	33	-
Farm size (ac)	3.0	6.4	12.2	20.1	.044
Land Tenancy (%)					
- Landless	14	-	-	-	
- Owners	71	20	67	50	
- Tenants	14	40		8	.082
- Owner cum tenants	-	40	33	42	
Farm Size Categories					
- <2 ha	100	20	25	-	
- 2-5 ha	-	80	42	33	
- > 5 ha	-	-	33	67	.000
Livestock Raising Orientation					
- Subsistance	-	100	17	17	
- Semi-subsistance	71	-	50	8	
- Semi-commercial	29	-	8	33	
- Commercial	-	-	25	42	.001
Education of Farm Managers					
- Primary	57	80	58	8	
- Middle	14	20	-	25	
- Matric and above	29	-	42	67	.047
Labour Use					
- Family	86	80	100	58	
- Family + Hired	14	20	-	42	.079
B. Secondary classificatory variables					
Manager Age (Years)	50	67	48	46	.065
Manager Experience (years)	27	48	31	15	.003
Family size (no)	7	23	8	11	.000

Livestock production system on typical farms at Irrigated Site

Livestock	Semi-subs.	Subs.	Semi-comm.	Comm.
Herd Size (no)	6.7	6.0	11.1	12.5
Buffalo (no)	2.0	1.0	3.6	4.5
Cow (no)	1.3	1.4	2.4	2.3
Total Milking Animals (no)	3.3	2.4	6.0	6.4
Calves (no)	2.1	2.0	3.4	3.4
Heifers (no)	1.3	1.4	2.5	2.5
Area under Fodder (%)	30	17	20	13
Farm Equipment Value (Rs. million)	.022	.023	.051	.31
Family Labor (000 hours)	4	7	4	3
Hired Labor (hours)	34.3	6.0	0.0	1347

Household income share



Income per capita

Ex-ante analysis of R&D Interventions

1. Fodder improvement (Lower fodder shortage, 13%↑dairy income, 6%↑ farm income)
2. Husbandry improvement (20% milk production with AI and reducing age of calving& calving interval)
3. Breed improvement (100% increase in milk yield of cow by cross-breeding)
4. Increasing herd size (increase in milk animals from 3-5)
5. Higher perceived milk price-Marketing (15% high price cool chain, Nestle etc.)

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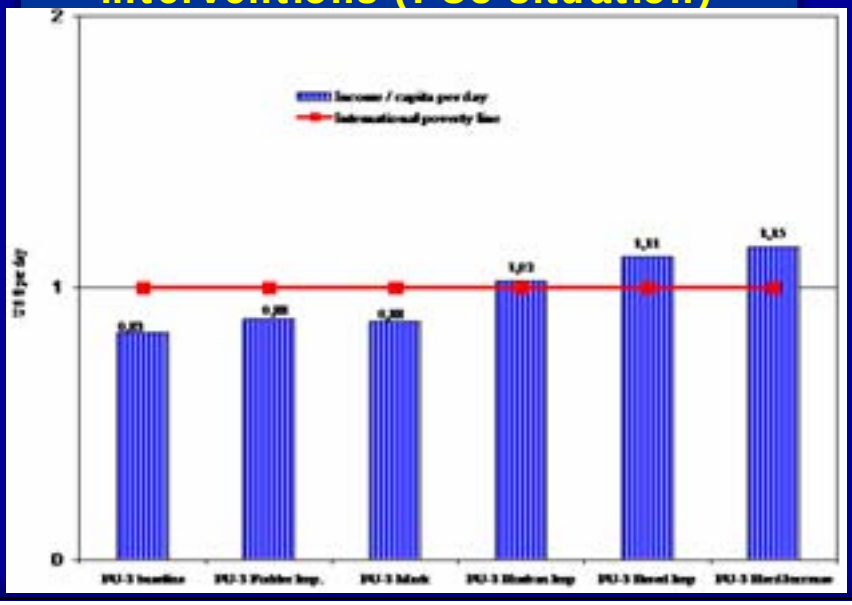
Comparison of improvement interventions (PU3 situation)



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Socio-economic Assessment of feed-Livestock Technologies

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Beyond Monitoring: Evaluation

- Evaluation is a process of judging value on what a project or programme has achieved particularly in relation to activities planned and overall objectives
- During project implementation Evaluation should be continuous process and should take place in all project activities
- This enables the project planners and implementers to assess the costs and benefits that accrue to the intended beneficiaries; and
- To progressively review the project strategies according to the changing circumstances in order to attain the desired activity and project objectives

Objectives

1. To analyze the strengths and weaknesses of validated technologies
2. To understand the technology choices of participating
3. To assess the acceptability of some of the advanced technological components to neighboring communities
4. To measure the costs and benefits of accepted technologies
5. To identify effects of market structure on technology adoption
6. To provide feed-back to the researchers and development agencies

Methodology

1. Data from research experiments and demonstration plots is collected through involving collaborating scientists, communities and development practitioners.
2. Data is also collected form participating and non-participating farmers and other stakeholders to solicit their perceived and observed benefits and costs of the technologies as well as their opinions on its potential adoption in different farm situations.
3. Monthly prices of agricultural and consumer goods and market situation in the integrated research sites will be collected in order to identify the marketing issues and price fluctuations that may affect technology adoption

No of farmers: All host and neighbouring farmers

Farmers Assessment of Rabi Season Technologies at Rainfed Site

Technologies	Current situation	Resason	Future intentions	Fallow farmers interest	Yield difference	Constraint
Oat	15 farmer plant	Early Maize planted	Adopt/ produce seed	High	↑50%	Seed supply
Oat+Vetch	Vetch mix new	Late green fodder availability	Adopt/ produce seed	High	↑20%	Seed supply
Berseem	1 Farmer	Multicut	4-5 more farmers plant	Medium	Not estimated	Grazing problem
Barley	15 Farmers	New snober var	No	No	Lodged Rain	Not suitable var
Awnless wheat	115 farmer	Fill availability gap	Already sowing	yes	More than barley	Seed

Farmers Perceptions about Fodder

- Awnless wheat could be replaced with high yielding oat varieties
- Aweless wheat provide fodder during scarcity period that liked by animals
- Berseem not adopted due to land fragmentation, free grazing and finishing crop in April-May
- Fencing required for protection of Berseem
- Situation will change as 5 more farmers are ready to plant Berseem
- Change in perception about premature hay making of oat, April-May milk yield sustained

Perceptions About Standing Summer Fodders

- High yielding Sorghum, millet, maize varieties introduced
- Cowpea and guar legumes mixed newly
- Cowpea good but difficult in cutting and seed production
- Guar mix end by Nov. as cowpea mix by Dec. and at "lepara" (12ac) lands farmers want to vacate field early

Feed Supplementation for Milk Production

- 7 households participated march-June
- March-April milk yield was good then declined
- Farmers perceive that ingredients not suitable, as these need more water
- Suggested to limit this to two months
- Farmers were favoring locally available "Anmol" than from UAF feed
- Morning milk price Rs. 25 and evening Rs. 22

Perception about Fodder Seed Production

- Farmers produced seed of oat during winter and fetched premium prices (Rs. 30/kg)
- High demand of seed from fellow farmers
- Profitability of oat seed vs wheat grain production (2.0 ton oat and 6.0 ton wheat per ha)
- 1-2 farmers try to produce seed of summer fodder crops
- Suggested participatory analysis of profitability of seed production

Partial Budget Analysis for winter trail on Buffalo at Hafizabad

	Without UMMB	With UMMB
Average Milk Yield Lit/day	6.96	8.30
Adjusted Yield (5% low)	6.96	7.9
Field Price of Milk Rs./Lit	16	16
Gross Field Benefits	111.4	126
Cost of UMMB (Rs/5 kg)	0	36
Transportation cost per block	0	2
Total Cost that vary for 6 days	0	38
Total Cost that vary (Rs./day)	0	6.3
Net Benefits	111.4	119.75

Marginal Rate of Return for winter trail on Buffalo at Hafizabad

	Without UMMB	With UMMB
Total Cost that vary (Rs./day)	0	6.3
Net Benefits	111.4	119.75
Change in Cost that vary		6.33
Change in Net Benefits		8.35
Marginal Rate of Return (%)		131

Sensitivity Analysis:

Maximum acceptable price of UMMB for buffalo during winter season was calculated keeping in view the price changes keeping the minimum acceptable rate of return at 100 %. It is clear from the results that UMMB would be feasible even if the price increases up to 41 Rs. /block. Max. acceptable field price were calculated by using following formula.

$$\Delta TCV = \frac{P_f \times \Delta Y_{adj}}{1+M}$$

Where

$$\Delta TCV = \Delta q_i \times MP_i + t_i$$

Sensitivity Analysis for winter Trial on Buffalo

Pf = Field Price of Milk	Rs./liter	16
ΔY_{adj} =Increase in Adj. Yield	Liters/day	0.9
M= Min Acceptable rate of Return	100%	1
t_i =Transport cost of variable input	Rs/kg	0.4
Δqi = Change in variable input	Kg/day	0.833
MP_i = Maximum acceptable Prices of UMMB	(Rs./Kg)	8.2
	Rs./Block	41.00

Partial Budget Analysis for Maize Varieties under Rainfed Conditions

	Local (T1)	S –2002 (T2)
Green Fodder Yield (t/ha)	26	38
Ad. Yield (t/ha)	23	34
Field Price (Rs/t)	460	460
Gross Field Benefits (Rs/ha)	10774	15709
Total Cost That Vary (Rs./ha)	1064	1836
Net Benefits (Rs./Ha)	9608	13873
Marginal Cost (Rs./Ha)		772
Marginal Net Benefits (Rs./Ha)		4265
Marginal Rate of Return (%)		552

Collaborating Institute..... BLPRI

Profitability Analysis UMMB and Feed Mix Production at Feed Mills Current Sale Level

	Jand	PD Khan
Total Initial Investment (70000 project)	110500	106500
Rental Charges building	12000	16800
Fix electricity	6000	3000
Interest Rate @ 10% on fixed investment	11050	10650
Management Charges @Rs.100/day for 300 days per annum	30000	30000
Total charges per year	59050	60450
Profit from UMMB	22539	28686
Profit from Feed Mix	694	1147
Total Profit (by deducting input costs only)	**23233**	**29833**
Net Economic Profit (excl. all costs)	**-35817**	**-30617**

Profitability Analysis at Enhanced Production Level

	Jand		P.D. Khan	
	UMMB	Feed Mix	UMMB	Feed Mix
UMMB production / year (#)	5250	3000	5250	3000
- Inputs cost / unit (Rs.)	43.8	373	42.6	368
- Total inputs cost (Rs.)	229950	1119000	223650	1104000
Av. Sale Price / unit (Rs.)	55	386	55	383
Gross Revenue (Rs.)	288750	1158000	288750	1149000
Gross Income (Rs.)	58800	39000	65100	45000
Total Profit from both	97800		110100	
Building Rent (Rs / annum)	12000		19800	
Management @Rs.100/day for 300 days per annum	30000		30000	
Interest on capital @ 10%	30000		30000	
Total Fixed Cost (Rs. / Annum)	11050		10650	
Net Economic Profit	53050		60450	

Economic of Rearing Beetle Bucks for Mutton Production-BVDP

	Hafizabad
Expenditure Side:	
Buck's Initial Cost (Rs.)	15000
Buck's Value After Retirement (Rs.)	10000
Management Cost (5 years @ Rs. 8000/Annum)	40000
Total cost of keeping for 5 years	45000
Total Number of Services (@70 services/annum)	350
Total cost/service (Rs.)	129
Present price	Free
Benefits Side:	
Returns from sale of offspring – 350 Males (each male fetches Rs. 1100/animal more)	385000
Returns from sale of offspring – 350 Males (each male fetches Rs. 725/animal more)	253750
Total benefit to community (Rs.)	638750
Total benefit to our community @ 65 services/annum	593125

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Example from Balochistan

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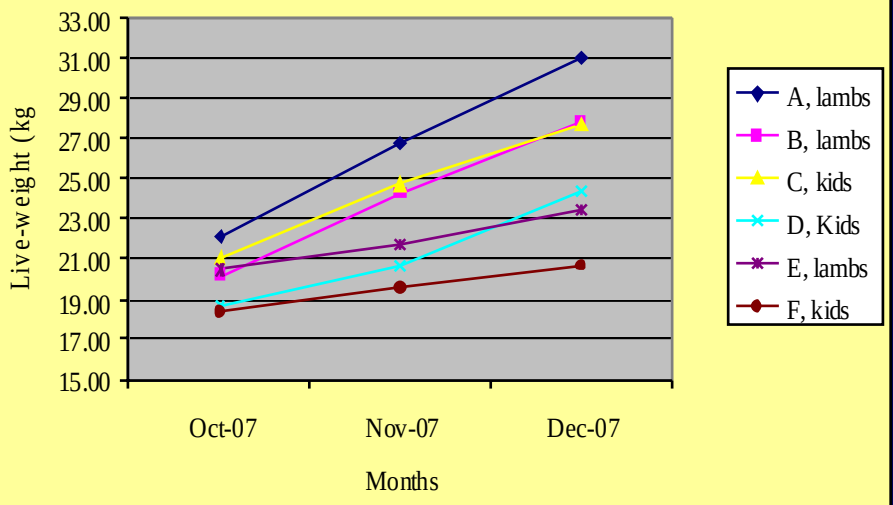
Comparative live-weight gain of weaned out Lambs/kids fed with fattening ration at Naliwalizai

S #	Experimental Lambs/kids Grouping	Treatment	Initial wt (kg) Oct-06	Final weight (kg) Dec-06	Net weight gain (kg) (75 days)
1	A, 15 lambs	Shukrana Feed @ 500 g / day	22.1	31	8.9
2	B, 10 lambs	--do--	20.15	27.83	7.68
3	C, 10 kids	--do--	21.1	27.6	6.5
4	D, 13 Kids	--do--	18.73	26.37	7.64
5	E, 30 lambs	Grazing	20.4	23.4	3
6	F, 30 kids	Grazing	18.3	20.16	2.86

Graph 4. Impact of fattening ration of lambs and kids at Nali Wali Zai.



Economic analysis/partial budgeting

Treatment	Lamb G1 Shukrana Feed @ 500 g per day	Lamb G 2 Shukrana Feed @ 500 g per day	Kid G 3 Shukrana Feed @ 500 g per day	Kid G 4 Shukrana Feed @ 500 g per day	Lamb G 5 Grazing	Kid G 6 Grazing
Initial Wt (kg)	22.1	20.15	21.1	18.73	20.4	18.3
Final Wt (Kg)	31	27.83	27.6	26.37	23.4	20.16
Difference (67 days)	8.9	7.68	6.5	7.64	3	2.86
Feed Consumed (kg)	33.5	33.5	33.5	33.5		
Cost of feed	335	335	335	335		
Cost of medication	19	19	19	19	19	19
Cost of labour	90	90	90	90	90	90
Initial cost of lamb	2652	2418	2532	2248	2448	2196
Total Cost per lamb	3096	2862	2976	2692	2557	2305
Income						
Lamb	3720	3340	3312	3164	2808	2419
Wool	62	62	10	10	50	50
Dung	35	35	35	35	10	10
Total income	3817	3385	3357	3209	2868	2479
Net Benefit	721	523	381	517	60	60

6

Analytical framework for impact assessment

M.Sc Students

Irfan Mehmood

M. Ahsin Javed

1. Comparative economics of diff dairy production systems
2. Food Security and Income levels at small farms vs. non-farm households

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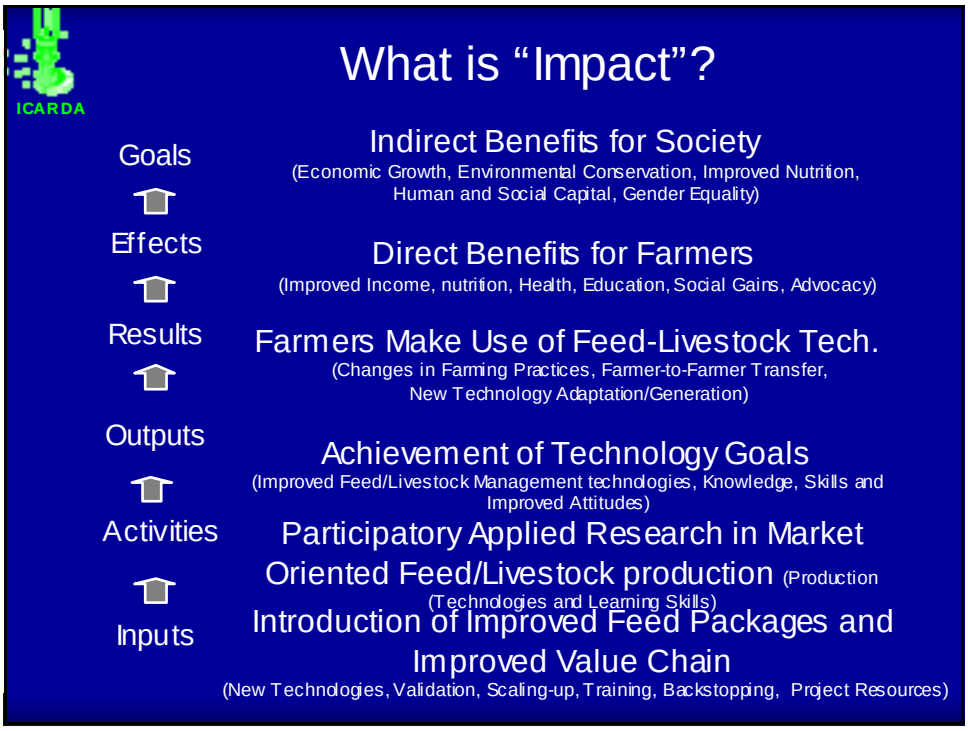
Objectives

- To collect data on pre-identified and verifiable indicators for short-term and long-term impact assessments
- To specify the nature and types of the integrated feed-livestock production system
- To estimate share of livestock in the livelihood of small farmers
- To estimate poverty profile of small farmers practicing different feed-livestock production systems
- To develop empirical basis for recommending policy interventions, institutional changes and up-scaling validated feed-livestock development packages


ICARDA
What is "Impact"?
Goals
Effects
Results
Outputs
Activities
Inputs
Indirect Benefits for Society
(Economic Growth, Environmental Conservation, Improved Nutrition, Human and Social Capital, Gender Equality)
Direct Benefits for Farmers
(Improved Income, nutrition, Health, Education, Social Gains, Advocacy)
Farmers Make Use of Feed-Livestock Tech.
(Changes in Farming Practices, Farmer-to-Farmer Transfer, New Technology Adaptation/Generation)
Achievement of Technology Goals
(Improved Feed/Livestock Management technologies, Knowledge, Skills and Improved Attitudes)
Participatory Applied Research in Market Oriented Feed/Livestock production (Production (Technologies and Learning Skills)
Introduction of Improved Feed Packages and Improved Value Chain
(New Technologies, Validation, Scaling-up, Training, Backstopping, Project Resources)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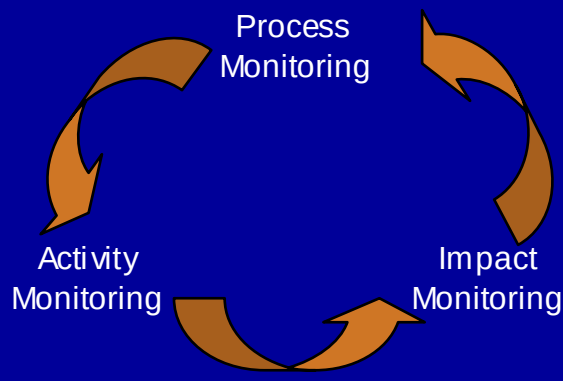
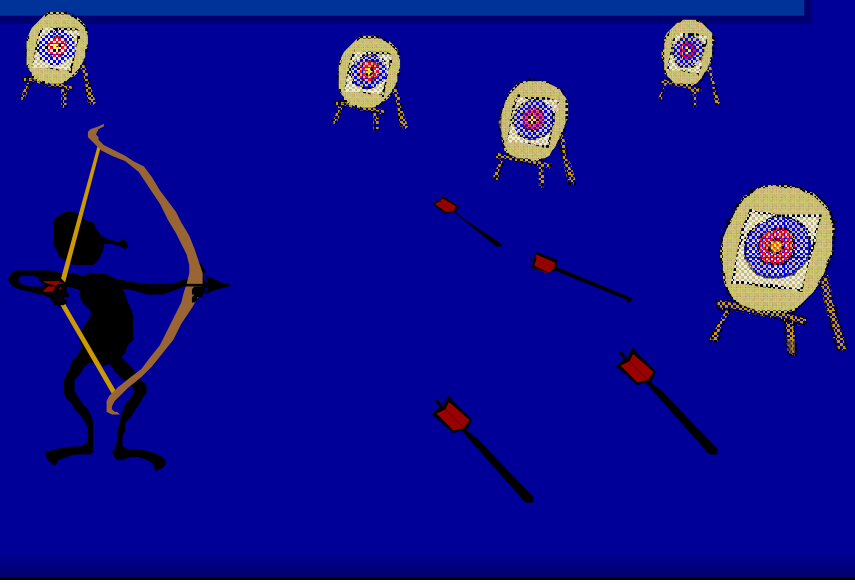
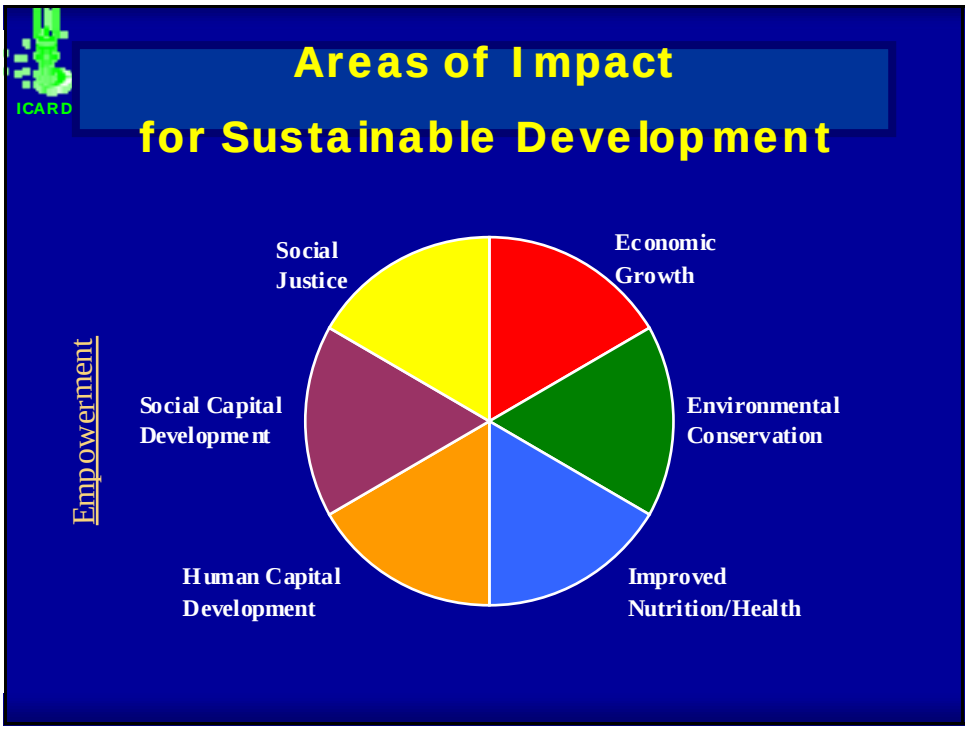
Impact Assessment is not...
Control and Punishment
Success Stories
Impact Assessment is ...
Self-Assessment and Learning
Management Empowerment
Interdisciplinary Special Studies

Project Monitoring Cycle



Fuzzy, Distant, Multiple Targets

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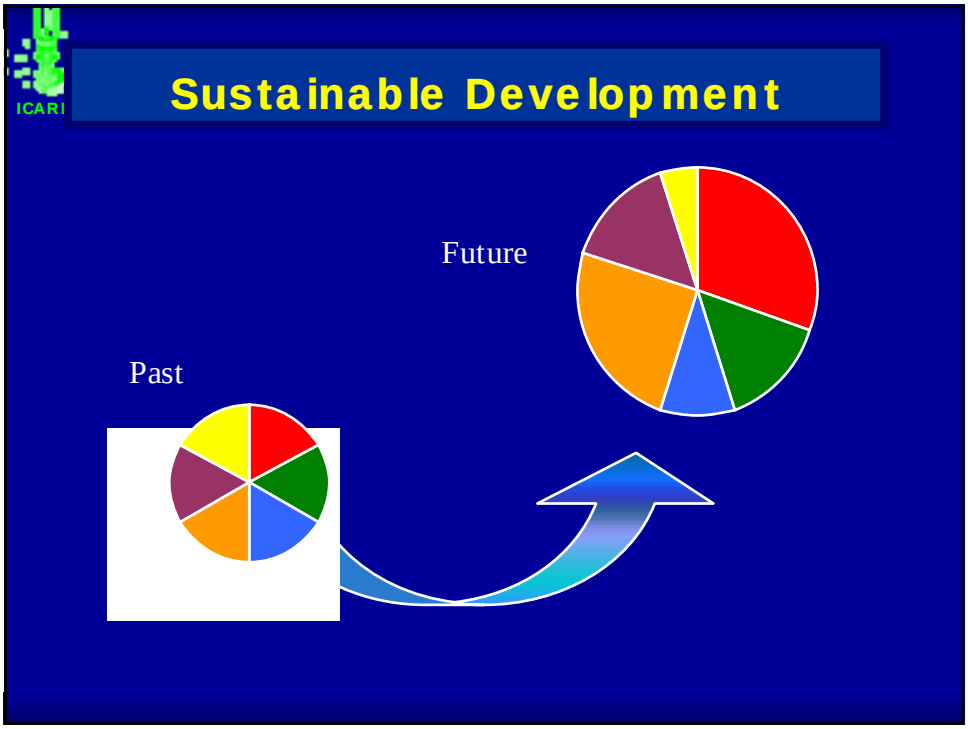
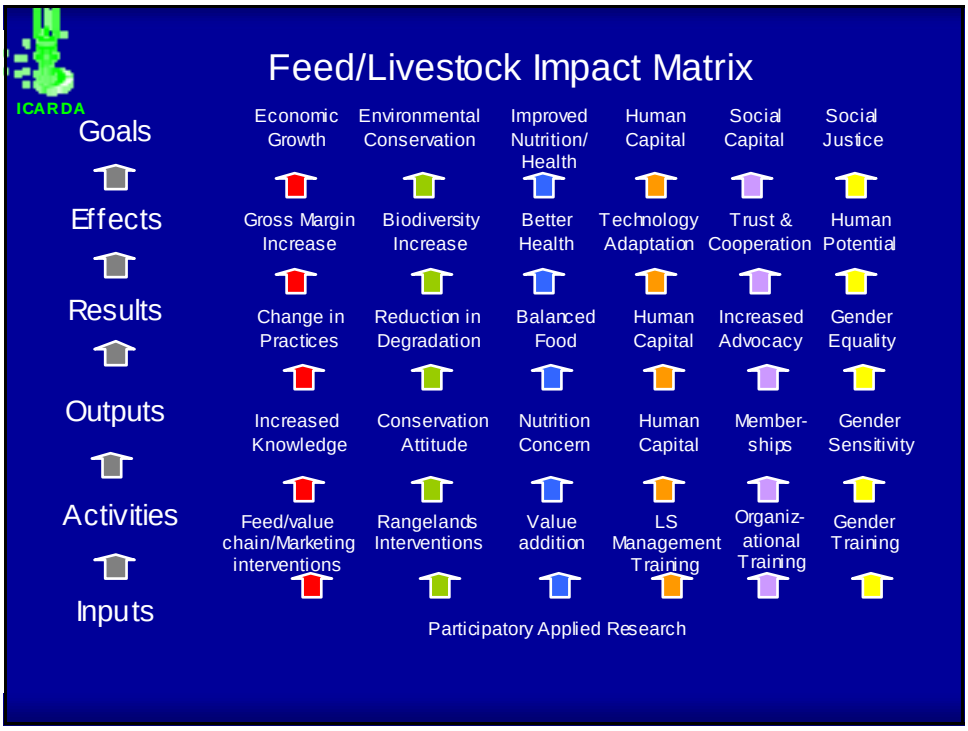
Areas of Impact
for Sustainable Development
Social
Justice
Economic
Growth
Empowerment
Social Capital
Development
Environmental
Conservation
Human Capital
Development
Improved
Nutrition/Health


ICARI
Sustainable Development
Future
Past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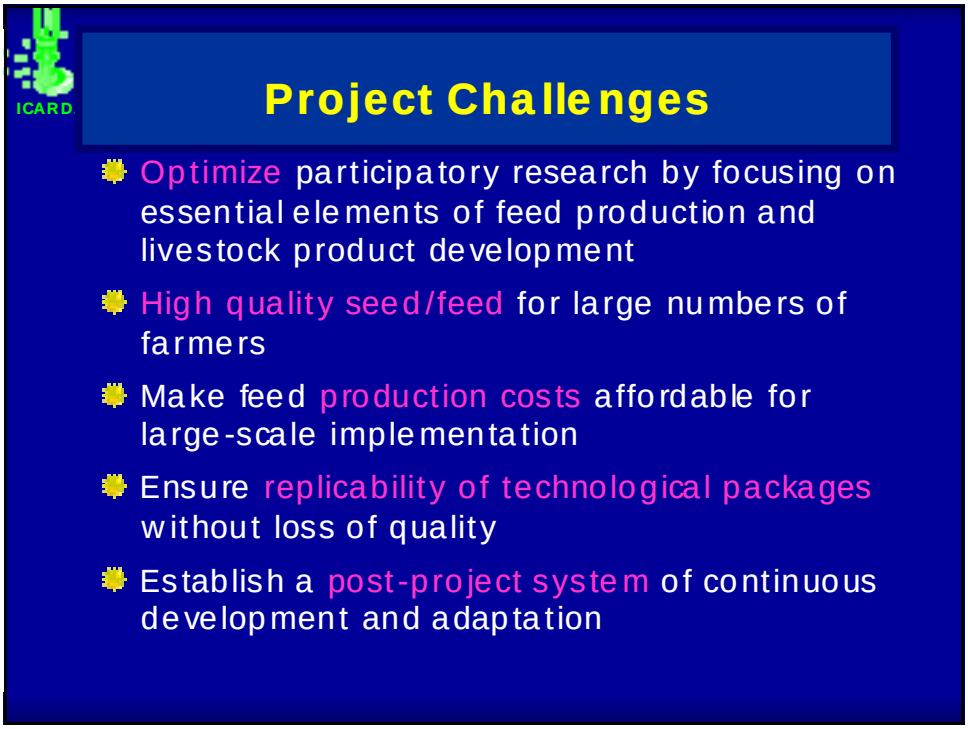
Feed/Livestock Impact Matrix
Goals
Effects
Results
Outputs
Activities
Inputs
Economic Growth
Environmental Conservation
Improved Nutrition/ Health
Human Capital
Social Capital
Social Justice
Gross Margin Increase
Biodiversity Increase
Better Health
Technology Adaptation
Trust & Cooperation
Human Potential
Change in Practices
Reduction in Degradation
Balanced Food
Human Capital
Increased Advocacy
Gender Equality
Increased Knowledge
Conservation Attitude
Nutrition Concern
Human Capital
Member-ships
Gender Sensitivity
Feed/value chain/Marketing interventions
Rangelands Interventions
Value addition
LS Management Training
Organiz-ational Training
Gender Training
Participatory Applied Research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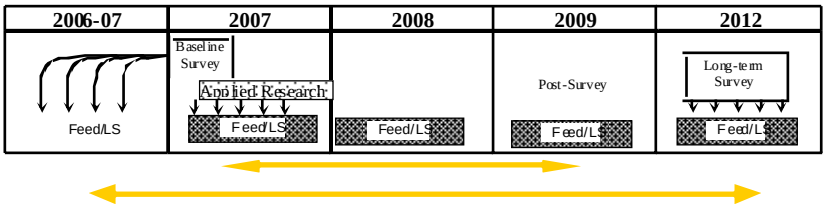
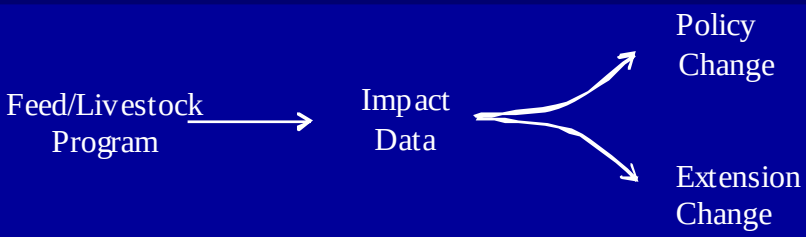
Project Challenges
Optimize participatory research by focusing on essential elements of feed production and livestock product development
High quality seed/feed for large numbers of farmers
Make feed production costs affordable for large-scale implementation
Ensure replicability of technological packages without loss of quality
Establish a post-project system of continuous development and adaptation

Farm Household Impact Survey



Policy Development

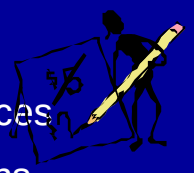


- What are the country's development goals to which Feed/Livestock will contribute?
- Which gains can a policy makers expect from supporting feed/livestock production packages?

Policy Changes

Sustainable Development

- Considering importance of feed resources in livestock development
- Investment in fodder and forage resources
- Promotion of sustainable technology/science
- Conservation of natural resources
- Elimination of market distortions



Case of FFS-IPM Short-term Impact Evaluation

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Change in Knowledge & Empowerments

(Differences of Differences)

Variables	FFS-Control			NFFS-Control		
	Pre	Post	Diff	Pre	Post	Diff
Knowledge: pest (#)	0.08	3.23	**3.15**	0.03	0.94	0.91
Knowledge: natural enemies(#)	0.13	2.93	**2.8**	-0.01	0.58	0.59
Decision making score	1	25	24	-5	0	5
Experimentation score	6	8	2	3	4	1
Biodiversity score	6	26	20	5	9	4
Attitude score*	4	46	42	2	9	7

* 15 Statements on: Dependence on pesticide, pesticide quality, price, health, environment, biodiversity loss, cultural methods validity, role of training in better pest control, dependence in advice on pesticides

Change in Input Use Levels

(Differences of Differences)

Variables	FFS-Control			NFFS-Control		
	Pre	Post	Diff	Pre	Post	Diff
Seed Rate (kg/ha)	-1.53	-7.97	-6.44	-1.82	-7.82	-6
Total Fertilizer	-62	-127	-65	-71	-135	-65
N (kg/ha)	-46.96	-82.2	-35.24	-57.28	-95.48	-38.2
P (kg/ha)	-14.97	-44.8	-29.84	-13.22	-39.91	-26.69
Insecticide (#/season)	-1.02	-2.68	-1.66	-1.44	-2.21	-0.77
Insecticide dose (kg/ha)	1	-4.8	-5.8	0.2	-3.6	-3.8
Field EIQ	-2	-239	-237	-34	-180	-146
Total Lab. Md/ha	12.53	9.15	-3.38	4.75	-9.88	-14.63

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Change in Outputs / Income

(Differences of Differences)

Variables	FFS-Control			NFFS-Control		
	Pre	Post	Diff	Pre	Post	Diff
Yield (kg/ha)	25.73	245.2	219.54	-125.4	-162.5	-37.05
GM ($/ha)	90.09	366.2	276.17	75.08	126.24	51.16
GM-(<2ha farmer)	0	414	414	66	158	92
GM (>4 ha farmers)	158	376	218	-55	85	140
Social Recognition Score	7	19	12	2	0	-2
Sick Days$	7.6	0.3	-7.3	-1.2	1.0	2.3
Precaution score	15	21	6	9	11	2

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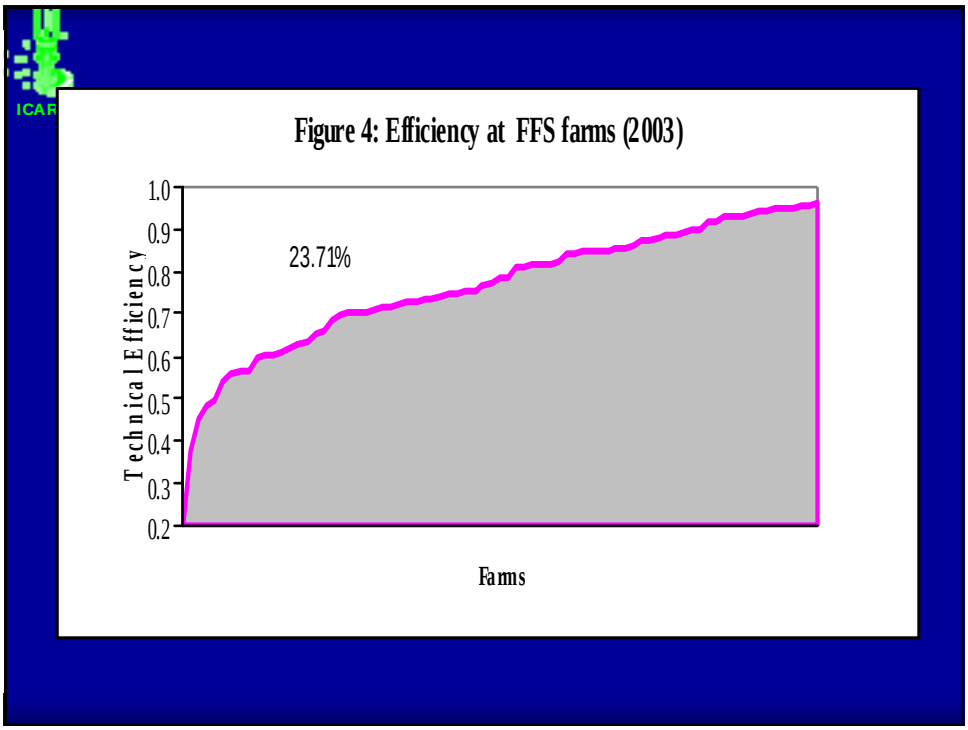
Poverty during Pre and Post FFS Scenario

Year	Type	Incidence	Poverty Gap	FGT	Gini	Redis.
2001	FFS	0.71	0.38	0.24	0.43	1.03
	Non-FFS	0.75	0.47	0.37	0.54	1.38
	Control	0.89	0.47	0.60	0.80	7.90
2003	FFS	0.55	0.25	0.15	0.47	0.34
	Non-FFS	0.69	0.39	0.27	0.52	0.88
	Control	0.85	0.70	0.80	0.95	7.49
2003	FFS Plot	0.41	0.16	0.09	0.41	0.18

Poverty on FFS Farms: Disaggregated

Year	Type	Incidence	Poverty Gap	FGT	Gini	Redis.
Attendance	Greater than 90%	0.40	0.18	0.12	0.53	0.12
	50-90%	0.59	0.26	0.15	0.46	0.38
	Less than 50%	0.56	0.26	0.13	0.35	1.23
Farm size	Up to 1 ha	0.67	0.46	0.34	0.42	2.78
	1.01-3.0 ha	0.66	0.29	0.17	0.36	0.85
	> 3 ha	0.35	0.12	0.05	0.46	0.07

FAO-EU IPM Programme for Cotton in Asia

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Thank You