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Dairy Development through Natural Resource Management: A Success Story of Drought Prone Village in India

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Abstract

Livestock sector is a powerful tool for sustenance of millions of poor worldwide, who otherwise becomes a victim of monsoon vagaries. Though the veterinary sciences have been blessed with a powerful tool but mere awareness and availability will not suffice the purpose. The ultimate end user i.e the farmers should be in position to take advantage of this situation and therefore the basic issues should be address first which are in the way of livestock sector development. Village economy and its development are based on its natural resource and their successful management by the village community for production. Natural resource management therefore has to be the key pin for an effective strategy for rural development. Livestock has been seen always a subsidiary of agriculture rather than as a separate entity, therefore failure in one will always affects the others. If this symbiotic relationships of these two sectors need to be success, then there is need of a holistic approach of development, which should address the basic issues such as water availability for irrigation, strategy to overcome frequent draft, infrastructure and organizational development for marketing and processing of the products through grass root level institutional mechanism. In 1985 with this holistic approach a Government of Maharashtra (India) came forward with its new programme called *Adarsh Gaon Yojana (AGY)* (Ideal Village Scheme), based on natural resource management. The programme was undertaken in 300 villages across 300 blocks in Maharashtra.

The present study was carried out at Hiware Bazar village of Ahmednagar District of Maharashtra to find out the impact of AGY on different sectors. A research design used for the study was 'Before-After with Control' and data was collected through 'Personal Interview' and 'Secondary Sources'. A total 117 respondents were selected randomly for the study (54 from Experimental Village and 54 from Control Village); similarly data was collected from 9 Government officials who were concerned to implementation of AGY in that village. Secondary data was also collected from *Grampanchayat* office (village administration unit) and NGO involved in the implementation of AGY to crosscheck the respondent's response. The present study revealed that, programme achieved great success particularly in the drought prone areas. Due to community watershed management; today ensured water availability is the biggest asset in the village. Agriculture and allied field has been revitalized. Villagers have turned toward the commercial cropping system. Today nearly 70 percent of villagers are engaged in dairy farming as a subsidiary occupation moreover it is now one of the major commercial enterprises in the village. In nutshell the overall impact of AGY can be summarized in terms of economic development, as earlier (Before 1994) out of 180 families, 168 were 'Below Poverty Line' and today (2004-05) it was noted proudly that, not a single family in the village is BPL. (Phand, S. 2005). The basic idea of Government of Maharashtra to start 'Ideal Village Scheme' was to overcome frequent drought through natural resource management by village community themselves. The findings of present study have revealed that, this approach is very much successful in achieving the set objectives and can further be replicated to other villages also.

Keywords: Dairy Development, Ideal Village Scheme, Natural Resource management

Introduction

Village economy and its development are based on its natural resource and their management for production. Natural resource management therefore has to be the key pin for an effective strategy for rural development in general and livestock sector in particular. Most of the rural development models have therefore considered natural resource management as the means for rural transformation. (Singh K 2004)

FAO has defined 'Natural Resources Management' as the management and conservation of the natural resources base, and the orientation of technological and institutional change in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generations. Such sustainable development conserves land, water, plant and animal genetic resources and is environmentally non-degrading, technically appropriate, economically viable and socially acceptable.

According to ILRI (2000), if livestock were to play a sustained role in improving the livelihoods of many millions of poor people who currently depended on them, the trade-offs between increasing income and food security while conserving natural resource needed to be understood and balanced, in the context of this multitude of factors, requiring an integrated approach to natural resource management.

Livestock had been seen always as a subsidiary of agriculture rather than as a separate entity and due to monsoon vagaries failure in one will always affects the others. Moreover it is a common phenomenon of drought prone region of India like Maharashtra where only 16 % of land has assured irrigation facilities. If this symbiotic relationships of these two sectors need to be success, then there is need of a holistic approach of development. Which should address the basic issues such as strategy to overcome frequent draft through watershed development, natural resource management; and thereby agriculture, fodder development; infrastructure development; marketing and processing of livestock products through grass root level institutional mechanism i.e cooperative milk society; to achieve the ultimate goal of socio-economic development of rural masses.

In 1985 with this holistic approach of rural development a Government of Maharashtra came forward with its new programme called '*Adarsh Gaon Yojana*' (AGY) (Ideal Village Scheme). The implementation of the programme was based on the following "Panchasutra" (The five principles) i.e. Donation of Labor (Shramdan), Ban on Grazing (Kurhad Bandi), Ban on Tree cutting (Charai Bandi), Ban on Liquor (Nasha Bandi), Family Planning (Kutumb Niyojan). The criteria for selection of village under this programme is that, village should be located in a drought prone area and should have shortage of drinking water as their major problem. The villagers should have to take an oath to follow above five principles (Warghade S 2003). The '*AGY*' aims at encouraging the villages to become self-sufficient and self-reliant by following the five principles and involving them in the watershed development programme with the assistance of NGO and government departments.

Though the initially programme was undertaken in 300 villages across 300 blocks in Maharashtra, but it was observed that even after 20 years implementation of programme only few villages have successful to get honored with 'Ideal Village'. Therefore in order to find out the secrets of successful villages a comprehensive study was undertaken. The present paper revealed the impact of AGY on dairy sector, particularly changes in livestock population, productivity, production and thereby income from livestock sector.

Research methodology

A research design used for the study was 'Before-After with Control' to reveal the impact of implementation of AGY in selected village.

Locale of the study

The present study was carried out purposively in two villages of Ahmednagar district of Maharashtra. One was Hiware Bazar, where the Government of Maharashtra has implemented this programme in 1994 through *Grampanchayat* (Village level administrative unit). A another village named Jamgaon 20 km. away from the Hiware Bazar was selected as control village for the comparative purpose, where no such programme was implemented. The rationale for selection of 'Hiware Bazar' is that, AGY

was implemented in village on 15 August 1994 and it was declared as an 'Ideal Village' in 1998; that means it took only four years to get that honor so it was felt necessary to study the secrets of success. Similarly the purpose of selection of 'Hiware Bazar' for 'Before AGY' study is that, though it is comparative study with control village but in social science studies it is very difficult to select a control village, which have similar demographic situation to that of the experimental village i.e Location, population size, infrastructure, accessibility to outside market or input agencies. Therefore to have a better picture of impact of AGY it was felt necessary to study the situation of 'Hiware Bazar' village prior to the implementation of AGY, so it can be reveal better; to what extent AGY is successful in changing the socioeconomic condition of villages.

Sampling procedure

A total 117 respondents were selected randomly for the study (54 from Hiware Bazar (Village- X / Experimental Village) and 54 from Jamgaon (Village- Y/ Control Village), which consist of 51 landholder and 3 landless respondents in each village. In addition the data was collected from 9 government officials who were concerned to implementation of AGY in that village.

Data collection

A pre tested semi structured interview schedule and direct observation was utilized for data collection. The data was collected on 'Before- After' basis which includes personal variables (age, education, family size, occupation, land holding size), Natural resource management and watershed development variables (continuous contour trench, loose boulder, earthen structure, percolation tank, water storage structures, cement bunds), Livestock development variables (herd size, herd management, milk productivity, milk production), Economic traits (annual income from livestock sector, total income). In addition secondary data was also collected from *Grampanchayat* office and NGO involved in the implementation of AGY to crosscheck the respondent's response.

Data analysis

Descriptive statistical tools like frequencies, percentages and percent change were utilized for analyzing the data.

'Before- After' concept

In the present paper the 'Before-After' concept has been used which is explained as follows; The year '1994-95' has been taken as references point to explain situation 'Before AGY' i.e 'Before 1994-95' for the experimental village (Hiware Bazar / Village-X) because the AGY was implemented on 15 August 1994 in that village, while the year '2004-05' has taken as 'After AGY' to show the impact of AGY as the study was undertaken in this particular year. i.e. about 10 years of implementation period. Similarly, for the control village (Jamgaon / Village-Y) where AGY has not been implemented, but

same '10 years' period (1994-95 to 2004-05) was considered to explain comparative situation in that village.

Table: 1. Salient features of the village Hiware Bazar (2002)

Physical features		Social situation	
Total geographical area	976 ha.	Total population	1245
Cultivable land	795 ha.	No. of males	620
Forest land	70 ha.	No. of females	625
Pasture land (Public)	6.75 ha.	No. of farm families	205
Pasture land (Private)	62.0 ha	No. of land less families	11
Community land	4.46 ha.	No. of milch animals	560
Irrigated land	795 ha.	No. of farm use animals	120

Result and Discussion

1. Personal variables

Table 2 indicates that, the selected respondents in the present study ranged between 20 to 70 years of age in both villages and most of them belonged to general caste. The average family size in village X was found 5.76, while in village it was 7.0. Majority (94.44 %) of the respondents had agriculture as their main occupation in both villages with average land holding in village X is 3.90 hectares and 5.00 hectares in village Y. There was found considerable difference in subsidiary occupation of villages. In village X nearly 70 percent of respondent was engaged in dairy farming as subsidiary occupation. Regarding the educational status of respondents' literacy percentage was far better in village X (89.67 %) than village Y (53.2 %) (Phand S 2005)

Table: 2. Personal variables of respondents

S. No.		Village X (N= 54)		Village Y (N= 54)	
		N	%	N	%
1	Age				
	Young (<30)	23	42.6	26	48.1
	Middle (30-50)	21	38.9	19	35.2
	Old (>50)	10	18.5	9	16.7
2	Caste				
	Schedule Caste	1	1.85	2	3.70
	Schedule Tribe	1	1.85	1	1.85
	Other Backward Classes	2	3.70	4	7.41
	General	50	92.6	47	87.1
3	Education status of respondents family (Above 7 years)				

Illiterate	31	10.3	168	46.8
Can Read	9	3.00	20	5.6
Read & Write	76	25.3	71	19.8
Primary	92	30.7	43	12
High	60	20.0	32	8.91
Graduate	32	10.7	25	6.96
Total	300	100	359	100
4 Occupation				
Main				
Agriculture	51	94.4	51	94.4
Dairy farming	0	0	0	0
Farm labour	3	5.56	3	5.56
Total	54	100	54	100
Subsidiary				
Agriculture	2	3.70	2	3.70
Dairy farming	38	70.4	11	20.4
Farm labour	0	0	0	0
Total	40	74.1	13	24.1
5 Family size (in numbers)				
	N	Average / family	N	Average / family
Children	11	0.20	19	0.35
Male	143	2.65	183	3.39
Female	157	2.91	176	3.26
Total	311	5.76	378	7.00
6 Land holding (in hectors)				
	Area (ha.)	%	Area (ha.)	%
Irrigated	192	96.7	63.0	24.7
Un-irrigated	6.50	3.27	192	75.3
Total	199	100	255	100
Average land holding	3.90		5.00	

2. Natural Resource Management

2.1 Watershed development

Being a major component of AGY today villagers has created various water percolations and storage structures on private and common village land through people participation and availing various government schemes. Data was collected through secondary sources on before and after basis regarding the number of such structures created, area covered

under such structures, similarly area covered under the tree plantation and total cultivable land (in hectares) in the village. Table 3 shows clearly that as watershed management is the part of AGY implemented in village X, there were more such structures as compared to its 'before' situation and also to that of the village Y. (Phand S 2005)

Table: 3. Achievements in watershed management under *Adarsh Gaon Yojana*

Items	Village X (Experimental)		Village Y (Control)	
	Before AGY (1994-95)	After AGY (2004-05)	1994-95	2004-05
	Total village area (ha.)	976	976	2970
Cultivable land (ha.)	795	795	2373	2373
Contour bund on land (ha.)	414	0	0	0
Continuous Contour Trench on Panchayat land (ha.)	0	10	0	24
Continuous Contour Trench on private land (ha.)	0	70	0	18
Tree plantation on land (ha.)	70	206	0	42
Tree plantation along roadside	0	6 Km.	0	0
Loose boulder (No.)	0	120	0	28
Earthen structure (No.)	0	2	4	6
Nalla bund (No.)	29	3	91	145
Van tale (No.)	0	2	1	2
Percolation tank (No.)	2	0	2	4
Storage bandhara (No.)	0	7	0	1
Cement nalla bunding (No.)	0	4	0	2
Repair nalla bunds (No.)	0	11	0	0
Wells (No.)	97	318	136	213
Trees (No.)	30,000	9 lakhs	90,000	1.6 Lakhs

2.2 Major decisions taken for natural resource management

It was notably observed in village X that, apart from the five principles of AGY i.e. Donation of Labor, Ban on Grazing, Ban on Tree cutting, Ban on Liquor and Family Planning. In order to sustain the development of the village; the villagers had taken certain other decisions in the *Gramsabha* (General meeting of villagers) such as; Water intensive crops like sugarcane and banana have been prohibited in the village, Use the micro-irrigation methods (drip and sprinkle) for horticultural crops, Ban on bore-wells for the irrigation purpose and Ban on selling of village land to any non- citizen of the village, but no such measures were found in the village Y. (Phand S 2005)

3. Herd size

This refers to the total number of animal heads such as cattle, buffaloes, heifers, bullocks, sheep, goats and as well as birds owned by the respondent. It was measured by actual enumeration. Table 4 shows that, there was sizeable increase in number of milch animals *i.e.* buffaloes, indigenous cows and crossbreds in village X as compared to its situation 'before' AGY and also than that of the village Y. The average milch animals of respondents family was increased from 5.2 to 7 after AGY in village X, while it shows decreasing trend in village Y. Though the crossbred was introduced 'after' AGY (1994-95) in both the villages, but in village X there are 78 percent more crossbred population than the village Y. Regarding the goats and poultry there was more or less decreasing trend in both villages. (Phand S 2005)

Table: 4. Herd size of respondent

Animals	Village X* (N=54)			Village Y** (N=54)		
	Before AGY (1994-95) No. of animals	After AGY (2004-05) No. of animals	% Change	1994-95 No. of animals	2004-05 No. of animals	% Change
Buffalo	25	71	184	29	40	38
Indigenous cows	30	77	157	55	59	7
Crossbred	0	123	-	0	27	-
Goat	225	109	-52	221	143	-35
Total milch animals	280	380	36	305	269	-12
Avg. milch animals/family	5.2	7.0	-	5.6	5.0	-
Bullocks	98	108	10	123	118	-4
Sheep	0	0	-	28	42	50

* Experimental Village; ** Control Village

4. Herd Management

4.1 Housing

Data on various practices of livestock rearing followed by the respondents before and after implementation of AGY, such as housing, feeding, breeding and health care aspects of different livestock being reared by the respondents were collected.

Table 5 reveals housing condition of livestock, in village X where almost 68.52 % respondents were housing their animals in *Katcha* type of house and 27.78 % had no shed at all prior to AGY, as compared to about 44.44 % of the respondents who had *Kathca* house and 55.56 % who had *Pucca* house indicating a 1400 % change. No animal remained without housing in village X after AGY. Moreover the situation changed in village Y also showing an improvement with 400 % increase in *Pucca* houses. Still 33.33 % respondents had no shed for housing their animals in village Y. (Phand S 2005)

Table: 5. Status of animal sheds (No. of respondents owned)

Type	Village X* (N=54)					Village Y** (N=54)				
	Before AGY (1994-95)		After AGY (2004-05)		% Change	1994-95		2004-05		% Change
	N	%	N	%		N	%	N	%	
Katcha	37	68.5	24	44.4	-35.1	29	53.7	21	38.9	-27.5
Pucca	2	3.70	30	55.6	1400.	3	5.56	15	27.8	400
No Shed	15	27.8	0	0.00	-100	22	40.7	18	33.3	-18.1

* Experimental Village; ** Control Village

4.2 Feeding

It is clear from the table 6 that almost all respondents were practicing mixed type of feeding *i.e.* Grazing and Stall feeding 'before AGY' in both villages, but due to strict ban on grazing in village X, most of respondents (75.9 %) turned towards stall feeding, but the mixed type of feeding (77.8 %) still prevails in village Y. (Phand S 2005)

Table: 6. Feeding system of animals (No. of respondents practiced)

Type of feeding	Village X* (N=54)				Village Y** (N=54)			
	Before AGY (1994-95)		After AGY (2004-05)		1994-95		2004-05	
	N	%	N	%	N	%	N	%
Stall fed	0	0	41	75.9	0	0	12	22.2
Mixed	54	100	13	24.1	54	100	42	77.8
Total	54	100	54	100	54	100	54	100

* Experimental Village; ** Control Village

4.3 Vaccination and deworming

Table 7 indicates vaccination status of livestock against some common ailments in both of the villages. It is evident from the table that, most of the respondents followed vaccination regularly specially after AGY against HS and FMD diseases in both the villages. But in case of Black Quarter, it is still neglected in village Y showing only 27.8 % respondent vaccinates their animal against BQ as compare to 94.4 % in village X. Vaccination of goat against PPR shows increasing trend in both villages, but was lesser in village Y (22.22 %) as compared to X (87.04 %). In village X all respondents found to follow deworming practice after AGY, where as in village Y only 40.7 % respondents have started deworming practice. (Phand S 2005)

Table: 7. Vaccination & deworming of animals (No. of respondents adopted)

Vaccination / Deworming	Village X* (N=54)					Village Y** (N=54)				
	Before AGY (1994-95)		After AGY (2004-05)		% Change	1994-95		2004-05		% Change
	N	%	N	%		N	%	N	%	
HS	15	27.8	51	94.4	240	18	33.3	48	88.9	167
FMD	12	22.2	51	94.4	325	13	24.1	46	85.2	254
BQ	11	20.4	51	94.4	363	7	12.9	15	27.8	114
PPR	0	0.00	47	87.1	-	0	0.00	12	22.2	-
Deworming	0	0.00	42	77.8	-	0	0.00	22	40.7	-

* Experimental Village; ** Control Village

4.4 Breeding practices

Artificial insemination (AI) is well proven economically breeding practice for large ruminants. Table 8 shows livestock breeding practices in the village, though after AGY the respondents of both villages turned towards AI, but it is more popular in village X (i.e 91.67 % and 88.89 % in case of indigenous cow and buffaloes respectively) than Y (25.93 % and 25 %) Regarding crossbreds 100 % respondents followed AI in both villages. (Phand S 2005)

Table: 8. Breeding practice (No. of respondents follows)

Type of animal	Village X* (N = 54)									
	Natural service					Artificial insemination				
	Before AGY (1994-95)		After AGY (2004-05)		% Change	1994-95		2004-05		% Change
N	%	N	%	N		%	N	%		
Indigenous Cows	13.0	100	2.00	8.33	-84.6	0.00	0.0	22.0	91.6	-
Crossbreds	0.00	0.00	0.00	0.00	-	0.00	0.0	24.0	100	-
Buffaloes	4.00	100	1.00	11.1	-75.0	0.00	0.0	8.00	88.8	-
Village Y** (N = 54)										
Indigenous Cows	27.0	100	20.0	74.0	-25.93	0.00	0.0	7.00	25.9	-
Crossbreds	0.00	0.00	0.00	0.00	0.00	0.00	0.0	9.00	100	-
Buffaloes	12.0	100	9.00	75.0	-25.0	0.00	0.0	3.00	25.0	-

* Experimental Village; ** Control Village

4.5 Treatment of animals

Table 9 shows substantial improvement in awareness of the respondents regarding treatment of animals in both villages. About 96 % of the respondents in village X turned towards qualified veterinarian for animal treatment showing 225 % change against the village Y. i.e. 114.29 % (Phand S 2005)

Table: 9. Treatment of animals (No. of respondents follows)

Particulars	Village X* (N=54)					Village Y** (N=54)				
	Before AGY (1994-95)		After AGY (2004-05)		% Change	1994-95		2004-05		% Change
	N	%	N	%		N	%	N	%	
By Veterinarian	16	29.6	52	96.3	225	21	38.9	45	83.3	114
By Local healer	38	70.4	2	3.7	-94.7	5	9.26	9	16.7	80.0

* Experimental Village; ** Control Village

5. Milk Productivity

It can be viewed from the Table 10 that there was substantial increase in the productivity of milch animals. In village X, productivity of indigenous cows increased by 52.08 % and for buffaloes it increased by 32.62 %, which may be the result of better management practices by the respondents, While in village Y productivity of indigenous cows raised marginally by 11.11 % and that of buffaloes by 6.38 %. It is also clear from the table that crossbreds were introduced in both the villages 'after AGY', but their productivity was found to be considerably higher (3650 liters/ year) in village X as compared to that in village Y (2920 liters/ year) (Phand S 2005)

6. Milk Production

Table 11 indicates the total milk production (in liters/ year) in the household of respondents from all livestock such as indigenous cows, crossbreds and buffaloes for a total lactation length. Before start of AGY (1994-95) the milk in village X was about 537 liter / family / year which was raised 5624 liter / family / year, While in village Y it was 371 liter / family / year which reached up to 1139 liter / family / year *i.e.* about 947 percent and 207 percent change village X and Y respectively. (Phand S 2005)

Fig: 1. Average milk production of family in village X and Y in 1994-95 and 2004-05 (liters / year). (N= 54)

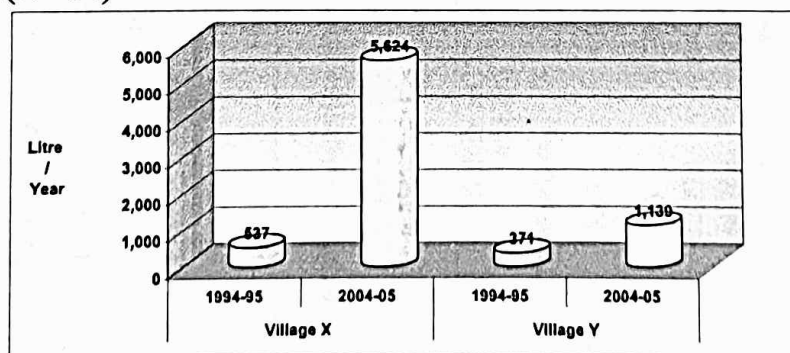


Table: 10. Milk productivity of dairy animals of respondents (liters / animal/ year)

Type of dairy animal	Village X* (N=54)				Village Y** (N=54)				
	Before AGY (1994-95)		After AGY (2004-05)		1994-95		2004-05		
	Productivity	%	Productivity	%	Productivity	%	Productivity	%	
Indigenous Cow	480.0	20.0	730	10.9	492	52.1	547	10.1	11.1
Crossbred	0.00	0.00	3,650	54.4	0.00	-	2,920	53.8	-
Buffalo	1,825	76.1	2,190	32.6	1,715	20.0	1,825	33.6	6.38
Goat	94.1	3.92	144	2.15	91.3	53.2	135	2.49	48.0
Total	2,399	100.	6,714	100	2,299	179.9	5,427	100	136

Table: 11. Milk production by the dairy animals of respondents (liters / year)

Type of dairy animals	Village X* (N=54)				Village Y** (N=54)				
	Before AGY (1994-95)		After AGY (2004-05)		1994-95		2004-05		
	Production	%	Production	%	Production	%	Production	%	
Indigenous Cow	1,440	4.97	13,870	4.57	2,463	12.3	3,832	6.23	55.6
Crossbred	0	0	2,48,200	81.7	0	0	35,040	56.9	-
Buffalo	12,775	44.1	30,660	10.1	3,431	17.1	9,125	15	166
Goat	14,764	50.9	10,950	3.61	14,143	70.6	13,505	22	-4.52
Total	28,979	100	3,03,680	100	20,037	947	61,502	100	207
Average per family	537		5,624		371		1,139		

* Experimental Village; ** Control Village

Fig: 2. Species wise contribution in total milk production of village X (liters / year) (N= 54)

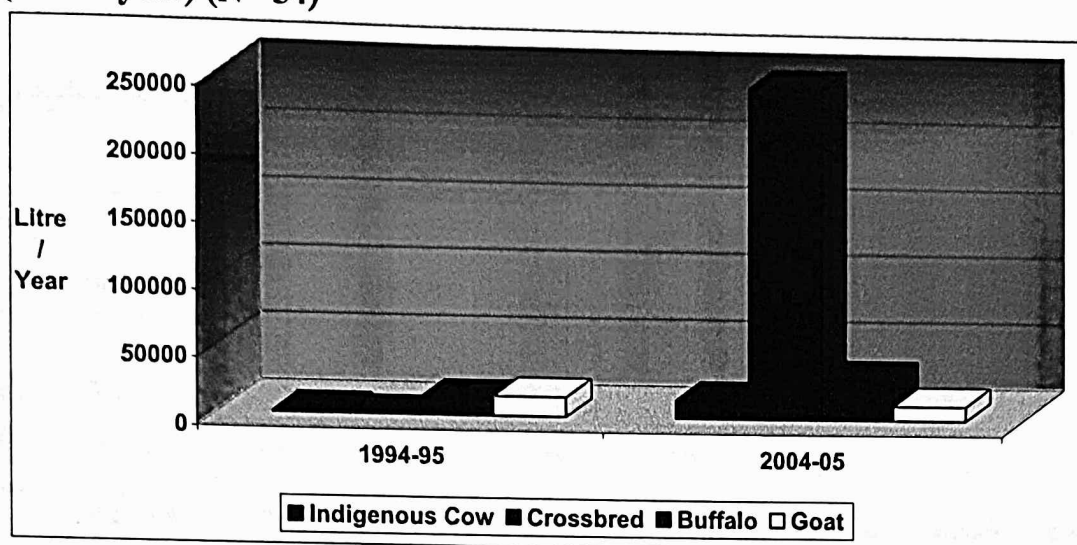
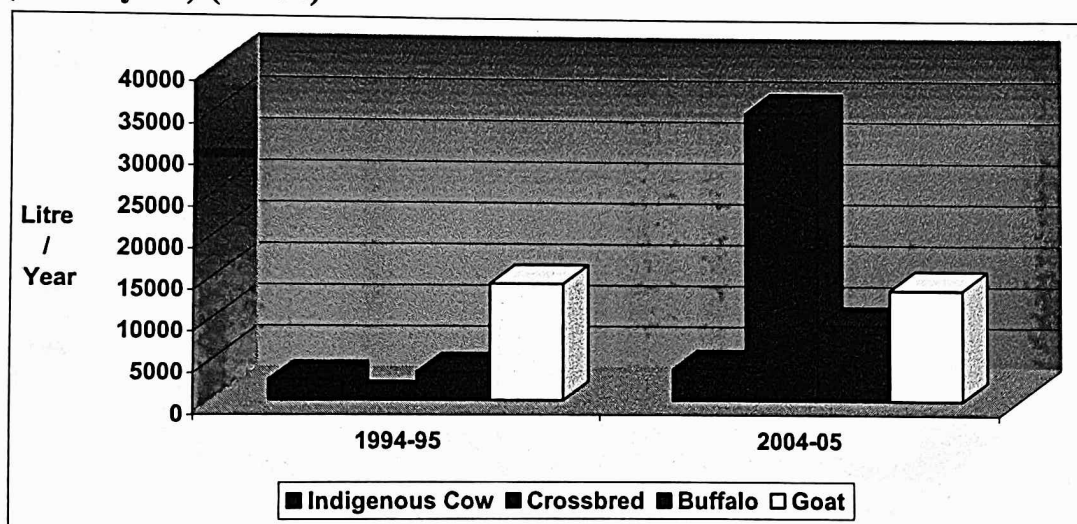


Fig: 3. Species wise contribution in total milk production of village Y (liters / year) (N= 54)



7. Gross Income from Livestock Enterprise (rupees / year)

Data regarding the sources of income from livestock enterprise was collected from the respondents for the year 2003-2004. The major livestock sources considered for the study were: milk, manure and the livestock sold in a year. The value of each item was estimated according to the current market rates at the time of study for 'After' (2004-05) situation. For 'before' situation price change effect was eliminated by considering the change in "Wholesale Price Index" in 10 years. It is observed that "Wholesale Price Index" has been changed by 194 % during this period. (Pagire B V et al 1999)

Table 12 indicates that, in village X before the implementation of AGY (1994-95) the average income of family from livestock was only Rs. 1754 / year, which is raised upto

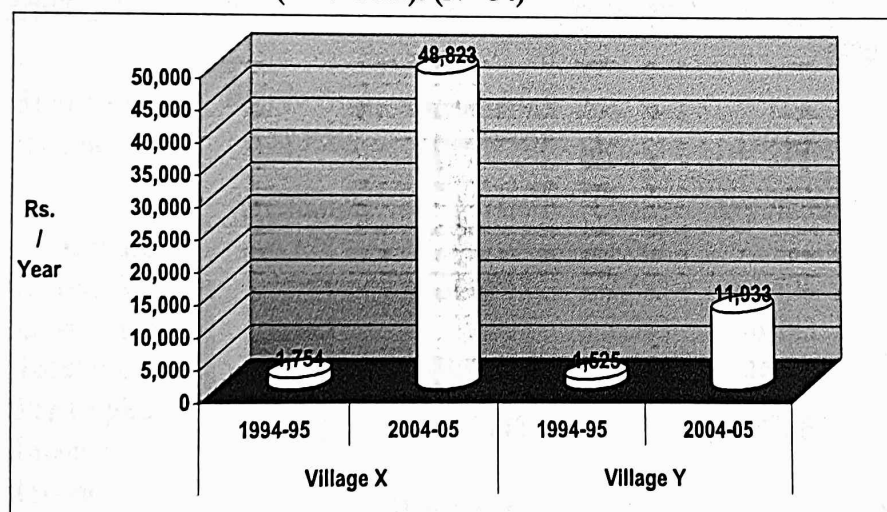
Rs. 48,823 / year showing 2,682 percent change over the years. While in case of village Y it was Rs.1525 / year in 1994-95 which rose marginally upto Rs. 11933 / year. The major reason for this marginal growth was unavailability of water due frequent drought situation in village Y. (Phand S 2005)

Table: 12. Average income of family from livestock enterprise (rupees / year)

Items	Village X* (N=54)					Village Y** (N=54)				
	Before AGY (1994-95)		After AGY (2004-05)		% Change	1994-95		2004-05		% Change
	Income	Avg./ family	Income	Avg./ family		Income	Avg./ family	Income	Avg./ family	
Milk	72,448	1,341	25,05,360	46,395	3,358	50,096	927	5,07,395	9,396	912
Manure	20,550	380	1,15,900	2,146	464	30,300	561	1,26,000	2,333	315
Animal sold	1,750	33	15,205	281	767	1,980	36	11,000	203	455
Total	94,748	1,754	26,36,465	48,823	2,682	82,376	1,525	6,44,395	11,933	682

* Experimental Village; ** Control Village

Fig: 4. Average income of family from livestock Enterprise in village X and Y in 1994-95 and 2004-05 (Rs. / Year). (N= 54)



8. Average Total Income of Family (rupees / year)

It refers to the total annual income of each family earned through various sources like agriculture, livestock, and farm labor etc. It can be viewed from the Table 13 that, though there is marginal difference in the agricultural income of both the villages in 2004-05, but the percentage change in income from agriculture is substantially higher in village X (1061 %) than village Y (437 %)

It can be seen notably that, there is great difference in average income of family from livestock sources particularly from milk, which is increased by 28 times over a period of

time in village X and stood as major contributor of total income *i.e.* Rs. 48,823/ year. Moreover it can be said that in village X livestock sector has been shifted from a subsidiary occupation to a commercial enterprise contributing equally or more towards total income of the respondents. While in village Y it increased by only 8 times.

Before AGY (1994-95) in village X the average total income family was only Rs. 8058 / year, which raised upto Rs. 132853 / year in 2004-05. While in village Y it was Rs. 16692/ year, which rose to Rs. 95673 / year in 2004-05. It can be noticed that in 1994-95 the average total income of families in village Y was almost double to that of village X, which can be attributed to larger land holding size (5.00 ha.) as compare to village X (3.90 ha.). But due to frequent drought over the years the growth of total income was found marginal (473 %) in village Y than the village X (1549 %). Therefore it is evident that for sustenance of rural economy natural resource management; particularly water management by the village community is essential component.

Moreover, It can be noticed from table 12 that prior to implementation of AGY (1994-95) in village X, the per capita income was only Rs. 1343 / year which rose to the Rs. 22142 / year in 2004-05 *i.e.* about 16.6 times, which is nothing but the impact of AGY, while in village Y it was Rs. 2385 / year in 1994-95 which reached to Rs. 13668 / year in 2004-05 *i.e.* only 5.7 times. (Phand S 2005)

Table: 13. Average total income of family (rupees / year)

Sources of income	Village X* (N=54)			Village Y** (N=54)		
	Before AGY (1994-95)	After AGY (2004-05)	%	1994-95	2004-05	%
	Avg./family	Avg./family	Change	Avg./family	Avg./family	Change
Agriculture	4,138	48,030	1,061	8,884	47,740	437
Livestock	1,754	48,823	2,682	1,525	11,933	682
Labor wages	2,165	36,000	1,563	6,283	36,000	473
Total income	8,057	132,853	1,549	16,692	95,673	473
Per Capita Income	1343	22142		2385	13668	
Income increased by		16.6 times			5.7 times	

* Experimental Village; ** Control Village

Conclusion

Agricultural sector is the key component of rural economy which totally depends on monsoon particularly in the drought prone region of India. Though the government initiatives are in progress to overcome frequent drought situation but many a times it may not be adequate and timely. On other hand drought and poverty will not subside by giving temporary help to the villagers, but the local community initiatives within the purview of 'Panchyati Raj System' (Village Level Administrative System) is the most important

approach. A local community initiative for successful management of natural resources of village through government assistance is the key component for sustainable development, which has been followed in implementation of AGY. The self regulatory code of conduct of AGY i.e. Donation of Labor (Shramdan), Ban on Grazing (Kurhad Bandi), Ban on Tree cutting (Charai Bandi), Ban on Liquor (Nasha Bandi), Family Planning (Kutumb Niyojan) has achieved great success in rural development particularly in the drought prone areas, which not only ensured the water availability for agriculture through their watershed management approach, but also proved successful for livestock development. Due to availability of fodder and livestock related facilities in the village; today 70 percent of the villagers turned to commercial dairy farming, which paved the way for institutional building (milk co-operatives) and taking advantages of new technologies like AI and Scientific management of livestock.

Scientific management of livestock has raised productivity of crossbred up to 3650 liter/year in village X as compared to the village Y (2920 liter/ year). Before start of AGY (1994-95) the average milk production in the respondent's families in village X was merely 537 liter / year which is upto raised 5624 liter / year and the average family income from livestock sector increased upto Rs. 48,823 / year in 2004-05 from Rs. 1754 / year in 1994-95 showing 2,682 percent change over the years.

Moreover it can be says, that in village X, dairy farming is no more as a subsidiary occupation but have changed to commercial enterprises contributing equally or more towards total income of the respondents. In nutshell the overall impact of AGY can be summarized in terms of economic development, as evident from the fact that neither a single family was 'Below Poverty Line' nor a single person was unemployed during inquiry as compared to the situation before implementation of AGY, when 168 out of 180 families were 'Below Poverty Line' in village X. Therefore there is urgent need to replicate this model to other part of country particularly in drought prone area.

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Abbreviations:

AGY: Adarsh Gaon Yojana (Ideal Village Scheme)

Village X: Hiware Bazar (Experimental Village)

Village Y: Jamgaon (Control Village)

Before: Year 1994

After: Year 2004

Grampanchayat: Village Level Administrative Unit

Gramsabha: General meeting of villagers

Panchyati Raj System: Village Level Administrative System