



**Can Technology Ensure Sustainable Livelihood for  
Poor Goat Peasants in India? :  
A Case Study of Nagour District, Rajasthan**

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***Ishwar Babu Bairwa***

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Members of the examining committee:

Supervisor's name (Prof. Dr. Ashwani Saith)

Reader's name (Prof.Dr. Max Spoor)

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***Inquiries:***

Postal address: Institute of Social Studies  
P.O. Box 29776  
2502 LT The Hague  
The Netherlands

Location: Kortenaerkade 12  
2518 AX The Hague  
The Netherlands

Telephone: +31 70 426 0460

Fax: +31 70 426 0799

# Contents

<b>Acknowledgement</b>	<b>v</b>
<b>List of Tables</b>	<b>vi</b>
<b>List of Figures</b>	<b>vii</b>
Figure 1 Analytical framework	vii
<b>List of Acronyms</b>	<b>viii</b>
<b>Chapter 1</b>	<b>1</b>
1.1 Introduction	1
1.2 Background	2
1.3 Global scenario of Goats	3
1.4 Regional context	4
1.5 Justification and relevance	4
1.6 Objective and Research question	5
1.7 Organisation of this paper	6
<b>Chapter 2 Research Methodology</b>	<b>7</b>
2.1 Introduction	7
2.2 Selection of the field site	7
2.3 Methodology	7
2.4 Quantitative data investigation	7
2.5 Qualitative data investigation	8
2.5.1 Personal interview	8
2.5.2 Focus Group interview	9
2.6 Secondary data collection	10
2.7 Personal professional Knowledge	10
2.8 Limitation of this study	10
<b>Chapter: 3 Theoretical Background</b>	<b>11</b>
3.1 Introduction	11
3.2 Goat farming as a Livelihood diversification strategy	11
3.3 Significance of Agricultural Intensification:	12
3.3.1 Brief description of technologies	13
3.4 The factors and concepts of technology adoption	13
3.5 Government Institutes and other stakeholders of livestock sector	15
3.6 The Sustainable livelihood approach to impact of technology	16
3.7 Description of analytical framework	17
<b>Chapter 4 Explaining Patterns of Technology Adoption: Findings from the Field</b>	<b>19</b>

4.1 Introduction:	19
4.2 Key determining factors to adopt and reject to technologies adoption	19
4.2.1 Categorization of goat peasants and current pattern of technology adoption	19
4.2.2 Socio- economic characteristics	20
4.2.3 Access to Resources	22
4.2.4 Personal variables of goat peasants	24
4.2.5 The rate of technology adoption	25
4.2.6 Lack of access to Technology	26
4.2.7 Lack of trained Human resources at local level	26
4.3 Role of Local Government Institutes in Diffusion of Innovations and delivery of services	27
4.3.1 Role of research intuition in goat breeding technology transfer:	27
4.3.2 Role of extension and veterinarian services institutes for technology transfer	28
4.3.3 Role of trainings and exposure for technology transfer	29
4.4. Outcomes of technology adoption at household	30
4.4.1: Increasing Income	30
4.4.2 Improving Nutritional Security	32
4.4.3 Increasing Environmental Sustainability	32
<b>Chapter 5</b>	<b>34</b>
5.1 Emerging Trend in Goat Development Sector	34
5.2 Pioneer goat entrepreneur perspective	34
5.3 Small scale women farmer's perspective	36
<b>Chapter 6</b>	<b>37</b>
Conclusion	37
<b>References</b>	<b>40</b>
<b>Appendices</b>	<b>43</b>
Appendix 1 Profile of Study Village	43
Appendix 2 Questionnaire for Survey	44
Appendices 3 Guide line for Focus group Interview:	46

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## List of Tables

1	Pattern of technologies adoption among goat peasants
2	Age group of head of Households
3	Distribution of technology adopters among in different social Categories
4	Education status among goat peasants
5	Resources owned by goat peasants
6	Distribution of human resources engaged in goat rearing:
7	Distribution proportion of technologies adoption among res Respondents
8	Distribution of increased income at household level
9	Use of goat milk at household
10	Use of dung or manure of goats:

## List of Figures

Figure 1 Analytical framework

## List of Acronyms

CPR	Common Property Rights
DFID	Department for International Development
ET	Enterotoxaemia
FFS	Farmer Field School
GDP	Gross Domestic Product
FAO	Food and Agriculture Organisation
GOI	Government of India
H.S	Hemorrhagic Septicemia'
HH	Household
ICT	Information and Communication Technology
IFAD	International Fund for Agriculture Development
IGA	International Goat Association
ISGP	Indo-Swiss Goat Development and Fodder Production Project
MGNREGA	Mahatma Gandhi National Rural Employment Guarantee act, 2005
MT	Million Tone
PPR:	Peste Des Ruminants
SIDA	Swedish International Development Cooperation Agency
VO	Veterinary officer



## **Abstract**

The study assesses determining factors to adopt package of technology among poor rural goat farming communities in Rajasthan state of India.

This study used a sustainable livelihood framework and innovation diffusion theory for primary data analysis. The primary data collected with survey, focus group and personal interview research tools in a village of Nagour District. The paper found that adoption of package of technology (Vaccine, Dewormer, Dairy Cattle feed and use of Bradizo-castraor) is influenced by socio-economic characters, resources and perception of technology. In socio-economic characters, age, social group, education are key decisive factors to uptake technologies. Middle age group (31-40 years) of goat peasants, other back word cast category and eight standard passed goat peasants adopted four technology package while others adopted zero to three technologies. Moreover, large goat flock size, land ownership and available family's member of labor for goat grazing are promoting factors to adopt technologies. Perception of technology, for instances, easy to handle, economic advantages, and available local animal health worker are necessarily encouraging factor to adoption of technology. It can derive from field findings that poor resource and weak socio-economic condition of peasants lead to deprivation from technology.

On the basis of empirical data, the study concludes goat farming is a potential activity in order to reduce poverty. Today, it requires paying attention of researcher, policy maker, academician, development professions to bring it at centre in development agenda.

## **Relevance to Development Studies**

Goat farming significantly contributes to poor's livelihood in both natural disastrous incidence and normal crop production year in semi-arid region. By exploring and assessing, Socio-economic, resources and technological perception of poor household are decisive to adopt technological aspect in order to pursue sustainable livelihood in rural and peri-urban area. This paper makes a theoretical contribution to literature on intensification of goat farming through technology adoption and rural sustainable livelihood.

## **Keywords**

Technology Adoption, Sustainable Livelihood, Goat Peasant, Broiler Goat

# Chapter 1

## 1.1 Introduction

Goat rearing play vital role to pursue sustainable livelihood for millions of poor household in semi-arid areas. As goat rearing is a key source of increasing income and mitigates environmental risks. Many case studies show that goat farming is a part of livelihood diversification in developing countries for the rural poor. Chamber (1997:162-187) has argued that ‘poor people in particular normally have to diversify sources of livelihood in order to survive in a risk – prone and uncertain world.’

Survival strategy for rural poor is difficult to maintain in longer term since world has been facing critical issues like food insecurity and increasing number of poor people. To shift from survival strategy to sustainable livelihood strategy for poor, intensification of diversified activity can improve the livelihood for poor. The goat rearing is a diversify livelihood activity which has been doing a traditional way for many centuries.

Historically, Not only India but also many developing countries has proved intensification of agriculture is a key livelihood strategy in rural area. ‘Beginning in the late 1960s, modern varieties of rice and wheat were introduced in a number of large developing countries that were struggling to overcome food deficits , including India, Pakistan, Bangladesh, China, Mexico, and Turkey. The use of modern varieties, chemical fertilizer reduced chronic food shortages through dramatic increases of food production in developing countries’ Gollin et al. (2005:1310). Today, Green Revolution also has been introducing in Africa continent with various learning lesson particularly positive and negative impacts. The effect of positive of Green Revolution like prosperity at farmer household in terms of income and food security in terms of well-being can be seen in Indian State of Punjab and Haryana where it was flourished. Researches show that in 1983, India got first time food sufficiency after independence. The negative impact of this revolution has been seen in last decade is that blind use of chemical fertilizer has been affected to fertility of soil. Green Revolution established a paradigm to get food security through adoption of new innovation which was unprecedented in developing countries.

Following success of Green Revolution in increasing bumper production of rice and wheat crop, government of India has taken up an Operation Flood<sup>1</sup> Program to increased milk production using diary-cooperative model and providing technology particularly breed improvement and prophylaxis measures in large animals. In consequently, India became one of the largest milk producers in the world. Misra and Ciamara (2010) admitted that Opera-

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<sup>1</sup> Operation Flood (1970-1996), the key purposes of this program was increase milk production (the flood milk), increase income of rural families and reduces regional price differences. <http://www.nddb.org/aboutnddb/operationflood.html>

tion Flood brought tremendous changes in milk production. India's milk production was 21.2 million MT in 1968, where as in 2007 it increased by 102 million MT and also generated employment for around 13 million families. The World Bank (1997) viewed the Operation Flood Program as a dream of rural development of twenty years.

This study takes household as a unit of analysis and it attempt to light on determine factors to adopt and reject technologies, role of local government intuitions to transfer of technology and impacts of technology adoption on livelihoods in semi- arid context. The analysis starts with socio-economic factors which hinder and promote to adopt the technology; it will go with analysis of field realities of institutional roles in diffusion of technologies. It also further proceeds with analysis of key outcomes of adoption of technology and new emerging trend in goat sector. The study assumes that technology adoption improved economic condition of household, this research paper argue that the benefit from technology adoption is depending upon people's socio-economic , household's resources, perception of technology and enable local institutional environment . While resource scarce goat peasants are reluctant to adopt technology because of the early investment requirement, resourceful households adopt technology for accumulation. Therefore, technology-driven goat development policy needs to be formulated separately for the resource scarce and resourceful goat peasants to secure sustainable livelihoods.

## 1.2 Background

Technology-induced growth in the livestock subsector... improves food and nutritional security, alleviates poverty, and reduces inter-regional and inter-personal economic inequities (Delgado et al 1999). Livestock play pivotal role to contribute to national economy. Livestock sub-sector currently contributing to 6% India's GDP and 25% to the Agriculture GDP and in last decade it has grown at an annual rate of 5.6%, which is higher than 3.3% growth of Agriculture. (Ali 2007). It also reflects in current 11<sup>th</sup> five year plan document of Government of India, 'the goal for the 11<sup>th</sup> five year plan (2007-2012) for the livestock sector would be first was to achieve an overall growth between 6 % and 7% per annum for the sector as a whole with milk group achieving a growth of 5% per annum, and meat and poultry group achieving a growth of 10% per annum. second, the benefit of growth should equitable benefiting mainly the small and marginal farmer, land less farmer and should benefit poorly endowed areas like drought prone, dried and semiarid and arid area (GOI,2002)'.

Since goat rearing is an integral part of livestock sub-sector, it has been played significant role to improve food and nutritional security, poverty alleviation in arid and semi arid areas. The semi arid and non-semi arid areas characterize low and erratic rainfall, high temperature, low fertile soil, and depletion of ground water. In such area, goats are being raised by peasants because of 'It has distinctive economic and managerial advantages over other livestock because of its less initial investment, low input requirement, higher prolific, early sexual maturity, and ease in marketing (Kumar et al 2010:760). Meat of goat (Chevon) is very famous to eat among non-vegetarian community across the world. It is not only improving food security but also reduce the poverty in

terms of increasing income of household. Secondly, goat milk is almost used in domestic purposes particularly drinking to infants and lactating mother in rural as well as urban area where the people cannot buy milk from market because of poverty. In such cases, the goat milk support in nutrition security which leads to improvement of health. IFAD (2004) summarised in its report that 'the world community has agreed to reduce the level of global poverty by half by 2015 and to improve the livestock-related livelihoods of the estimated 600 million poor livestock keepers who can make an important contribution towards this goal. The rapidly growing demand for livestock products in the developing world is opening up opportunities for poverty reduction led by economic growth, provided the appropriate policies and institutions are in place'.

Technological innovation is one of the important factors to improve the goat production system in order to reduce poverty in rural area. The key technologies in goat farming are vaccine, de-wormer, scientific method of castration and dairy cattle feed. Vaccine and de-wormer explicitly reduces the mortality rate among goat flock and improve the productivity of goat. As a result goat peasants get less loss due to diseases. Goat is a sensitive species to disease, for instances, ET, PPR, HS, goat pox. The veterinarian theory concluded that preventive cure is less expensive than post-cure or post-treatment. In preventive cure is a concept in which people vaccinate to goats in advance or before disease contacted to goats. Secondly, De-worming is a process in which medicines use to kill internal parasites. Thirdly, by doing castration, goat peasants can rear pure breed, and pure breed of buck and doe always have high demand in market. The Bardizo castrator an instrument often available at local veterinarian centre, which also do at very low cost. Dairy cattle feed often available at local dairy cooperative which is nutritious for cattle including goat species.

### **1.3Global scenario of Goats**

Goats can be seen across the world. FAO (2003) stated that about the distribution of world's goat population. The total world's goat population was 7.7 millions in 2003 which was increased 26% to year in between 1993 and 2003. Only in Europe and Oceania the growth of population decreased between same periods (1993-2003) that is 2.6% and 6.2 % respectively. The growth of population of goats in the world is also an important factor to look at goat breeding for development perspective for poor. Devendra (2010) presented a global scenario on goats in 9<sup>th</sup> International Goat Conference through his plenary paper what is most important that growth of goat population annually is 2.6% which is more than human population growth rate that is 2.4%. The population of goat in Asia is more than Africa continent which was around 45%. In India, according to 17<sup>th</sup> Livestock census (2003), Proportion of goat population in total livestock population was 25.6% in year 2003.' Owing to their greater socio-economic relevance, the growth in goat population in India over the past five decades (1951-2003) has been steady adding 1.484 millions goats annually. About 70% of the land less agriculture labors, marginal and small farmers in the country in the country are associated with goat husbandry (Kumar et al, 2010:1)'. Goats are basically rear because do diversify the livelihood activities

so that in stress condition people can cope up with these stress particularly natural disaster like drought, flood and so on. 'In pastoral societies in India, goats are kept as a source of additional income and as an insurance against shocks of crop failure. In addition, the rural poor who cannot afford to maintain cow or buffalo find goats as the best alternative source of supplementary income and milk' (Shalender et al 2010:1).

## 1.4 Regional context

Agro-ecologically, Rajasthan is the one of the province of India which come under arid or dry region. Data shows that drought in Rajasthan is a common phenomenon in such context, livestock in general and goat rearing in particular rearing is a critical livelihood strategy for rural poor to minimize risks of natural disastrous and calamity. As goats can survive and remain productive in adverse condition because it's biological tolerance to adverse weather. 'Out of 100 years (1901-2000), the Indian arid zone experienced agricultural drought in one part of the other during 43-68 years, which suggest that drought in this region occur once in three years to alternate years' (Narayan et al. n.d.). Nonetheless, Goat is the most suitable species arid area and for resource poor farmers. According to 17<sup>th</sup> Livestock census in India (2003) the population of goat in Rajasthan is 1.69 million which constitute 8% of India's goat population.

The role of Indo-Swiss Goat development Project which was crucial to improve the goat sector in the state. The project had implemented at State Buck and Calf Rearing centre, Ramsar, Ajmer. On the basis of International Corporation<sup>2</sup> experience, the project began in early 1980s and bound up in the year 1994. The aim of project was to develop suitable strategies for improving income generating capacity and to provide nutritional security for poor section. In surrounding villages of this centre, the impact of this project still can be seen in various development ways in goat rearing.

## 1.5 Justification and relevance

World Development Report (2008:10) viewed that '... Improving the productivity, profitability and sustainable of small farming is the main pathway out of poverty in using agriculture for development'. In fact, poverty is a crucial issue in the world as 1 billion people live below \$1 a day. Most of poor people live in rural area as WDR (2008) reported that three people out of four people live in rural area. Around 65% people in rural area depend on agriculture and livestock for their livelihood.

In given scenario, globally, three key strategies to alleviate poverty from the developing world have been suggested in development discourse or sustainable livelihood framework. First is agricultural intensification defined by Tiffen et al.(1994:29) 'increased average inputs of labor or capital on

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<sup>2</sup> International Corporation is an international NGO. For further information ; : <http://www.intercooperation.org.in/images/SDC-ICis%20livestock%20sector%20experience.pdf>

smallholding, either cultivated land alone or on cultivated and land grazing land, for the purpose of increasing the value of output per hectare'. Second is Livelihood diversification refers to attempts by individual and household to find new ways to raise income and reduce environment risk, which differ sharply by the degree of freedom of choice ( to diversify or not), and the reversibility of the outcome' (Hussein and Nelson 1998:3. ). Third, '...migration, understood as a spatial separation between the location of a resident household or family and on or more livelihood activities engaged in by family members, is a central feature of the livelihood of the majority of household in low income countries' (Ellis 2003:4)

This study focuses 'Livelihood diversification and intensification strategy to reduce poverty in semi-arid region where most of the rural poor choose this strategy to construct sustainable livelihood. On the one hand, as most of farmers face drought, low soil fertility, low crop production constraints to secure livelihoods in semi-arid area. In such situation, rainfed farming diversify with goat rearing as goat species can survive in harsh conditions and very low investment in comparison of other animals.

On the other hand, due to increasing income of middle class families, and changing food habits of them, consequently increasing high value meat products demand, needs to improve the productivity of high value meat products to feed the world. To bridging this gap, poor goat peasants are willing to join this global market thorough increasingly productivity of goat farming buck, Although they have limitation to access to inputs particularly technological innovation and also one of important constraint is that lack of support of institute Therefore, there is a critical need to explore determining factors which hinder and promote to adopt technology.

Secondly, what motivated me again and again to choose this theme as a research topic is that I have worked on same theme for three years. During my last working tenure I met one goat farmer who told me a real story about his prosperity through goat rearing. The story has been inspired me although the goat rear is literally literate and around 55 year old, the fact is the person established a paradigm in goat sector by improving his life standard and well being as well as his family.

The notion came in mind that if one or few people can proved that goat farming has potentiality to reduce the poverty. Poverty reduction is complex and multidimensional; it is a bit difficult to understand without empirical evidence. Therefore, there is necessary to do a study to explore potential area of goat farming as a strategy of livelihood diversification.

## 1.6 Objective and Research question

The main objective of this study is to assess some of factor that determine use of vaccine, de-wormer, bardizo castrator, dairy cattle feed by goat peasants in India, taking one village of Nagour district of Rajasthan, India for study.

The central research question of this study is why do some goat farmers adopt goat technological products (vaccine, de-wormer, dairy cattle feed, and

bardizo castrator) in goat husbandry, while others do not, to secure sustainable livelihood?

More specific research questions are:

1. What are the determining factors to adopt technology, and not to adopt technology among goat peasants in arid area?
2. What the roles of government institutions are in transfer the goat development technologies?
3. How do these goat development bio-chemical and mechanical technologies affect sustainable livelihood of goat peasants?

## **1.7 Organisation of this paper**

This paper is organized in a logical sequence in line with the research objectives and questions. The paper consists six chapters where the first chapter has begun with introduction which encompasses background, justification and relevance, objective of research and questions. The research methodology and methods and limitation of study are discussed in chapter two. The third chapter deals with theoretical background which theories and key concepts. The study analysis of empirical data is discussed in chapter four. Emerging new concept is broiler goat documented in chapter five. Finally and six chapter conclude the paper and focus on contribution of the study in the broader academic literature besides the key findings.

## **Chapter 2 Research Methodology**

### **2.1 Introduction**

The chapter provides discussion on how this paper acquired to research questions. This chapter discuss about how primary and secondary data collected and which methods used and data sources. It also documents the limitation of the study data.

### **2.2 Selection of the field site**

The data collected from Banwal village of India. Prior to select this village, the researcher adopted a selection process. In this process, I visited three villages including Banwal namely Kadel, Bassi. Of Nagour district. The three main criteria to select a village for data collection were: first, how many people do goat farming in a village, second, how many goat farmer adopting technology and not adopting technology in roughly or just an idea. Third, the size of village does also matter not too big or not too small size, so that researcher can collect data easily in limited time and resource. I collected basic data as per selection criteria from all three villages. Collected basic data from key informants and local government institution regarding goat keepers. Kadel and Bassi had 200 households. Most of them they do not do goat farming as a scientific way, and also most of goat farmers of these villages have not been adopting technology since long times, so these village were not most suitable for this study. On the other hand, The Banwal village meet all above three criteria according to primarily information, size of village around 500 households and most of the people do goat farming, most of them adopt technology driven management practices and few of them still do not adopt technology. That's why Banwal village finally selected for this study.

### **2.3 Methodology**

This study is used two types of data collection sources namely primary and secondary data. The Primary data collected from field site is used mixed methodology approach which means a combination of quantitative and qualitative data. To quantitative data collection, Survey was conducted in a study village. In qualitative data collection, the study conducted personal semi-structured interview and focus group interview. To collect secondary data, the study is used renowned journal, scholars' articles, local plan and policy document and related academic literature. In this study, the household is considered as a unit of analysis and operational scale is a Banwal village as a whole.

### **2.4 Quantitative data investigation**

To collect quantitative data, this study conducted a survey in a Banwal with the help of one research associate. The language of community is not Hindi and taking notes was not possible at the same time to facilitation of interview for researcher. To meet these challenges, the researcher recruited one local expe-



rienced for support to collection of qualitative data and to fill out 48 survey instruments. The recruited research associate was a local NGO worker, experienced in survey based research. He has good experience in goat development projects, and knows local dialects or language. A brief orientation was given to research associate by researcher and the instrument for survey developed in Hindi language to fill it out. Prior to conduct survey, the researcher found out only total household figure, but not a complete list so that researcher and his associates developed a long list of total household who reside in this village with the help of villager's group, the group comprise old and young people, women, also key informants like local government official. After developing a list of household, it was verified randomly. The aim of verification was to delete the name of household who do not live currently in village and name is present in the list. Finally, the list developed 474 households who currently live in this village. In other words, the population size of Survey is 474 households.

The size of sample was 10% of its population of sample that is 48 household. The selection of respondent was done through a systematic random method, in which from list of sample population picked one respondent from no. 1 and next respondent picked 10 from list and so on.

Before conducting the survey, the questionnaire or instrument of survey tested with some of potential respondents and re-editing and adding and deleting questions in instrument. Finally, a 22-questionnaire survey instrument was prepared.

The survey instrument encompasses various variables particularly, socio-economic back ground of household, technological aspects of goat farming, livelihood resources, future aspiration for their kids regarding goat farming, and marketing of goat's products.

The survey was used face to face survey administration method, in which researcher and research associate fill instrument out through face to face interview and discussion at door to door of households. The tool for data analysis used simple statistical method like proportion.

## **2.5 Qualitative data investigation**

The key objective of collection of qualitative in this study is to provide complement to analyse the quantitative data and support to interpretation of quantitative data and also validate the data. To collect the qualitative data collection, this study used two type interviews, first was personal in depth-interview and second was focus group interview.

### ***2.5.1 Personal interview***

The study did eight interviews with cases and key informants. The cases were three, first case was taken as a best goat farmer in terms of advance in technology adoption, having large goat flock size, motivated and inspired to other goat keepers. Second case was on an average goat-keeper, not much advance in technology adoption, who has medium sized goat flock size, self motivated and this case motivated only him. Third case was poor goat keeper in terms of technology adoption, size of goat herd, no much motivation he has. The cases were selected through purposive sampling.

Five key informants were selected for this study. Two key informants were local official; local officials are technical expert from department of animal husbandry. One official who works at Banwal veterinarian government sub-centre, another key informant works as an assistant director at State Research Buck centre, Ramsar, Ajmer. Moreover, the key informant is actively involved in developing guidelines on goat development program for state; he is also influence to policy decisions regarding animal husbandry at large. Two key informants were goat keepers who have good knowledge and expertise in goat rearing. One key informant was pioneer and rich entrepreneur who supposed to investing money in goat rearing as a business. Although, this key informant was not planned to conduct interview, as researcher do not have idea before to arrive field site. It was taken strategic decision by researcher because this entrepreneur tries to establishing new paradigm in goat farming.

Prior to conduct interview, the researcher designed an instrument which is semi-structured for an interview and tested with few respondents and did changes in instrument and train to research associate about his role that is to take notes and interpretation when ever need to interpret local language in Hindi for more clarification.

The personal in-depth interviews took place in informal setting at their home and in office. The place often we selected as per their comfort zone of goat farmers which was usually at their home, and for local official and rich goat entrepreneur, the place for interview was their office.

The time duration on an average around 1.00 hr to 1.5 hrs was consumed for an interview with an interviewee.

### ***2.5.2 Focus Group interview***

After conducting survey, this study identified the list of households who have been adopting technology and those who have not been adopting goat technology. As a result, the researcher made a two groups for interview from the list in simple random technique, first group who have been adopting technology or technology adopter, second group, the member of second groups have not been adopted technology.

In technology adopter group, the respondent was attended eight people for interview, while six respondents were attended in second group. The time duration for interview was minimum 1.00 hrs. It was also ensure that all members who identified already that should be attend in group interview. To meet this challenge, the researcher informed to all respondents of group interview through key informants or advance farmer in advance or before one day.

This research used a strict set of questionnaire which was tested. The final edited, set of questionnaire administered in both group interviews. While I was conducting a focus group, at first introduce as a researcher my colleague as a research associate and also briefed purpose of study and group interview. I also got consent over video recorder and to take some pictures. The researcher role was only facilitation to group interview in proper way and asking to structured questions and create conducive environment that every respondent can participate in group interview. In the end, gave vote of thanks to all respondents.

## **2.6 Secondary data collection**

The study have been used secondary data particularly summary report of total household, report of Indo-Swiss goat development and fodder production project, voter list of Banwal, existing academic literature such as journal, text books and working papers. I reviewed and analyse the primary data in light of research question and objectives.

## **2.7 Personal professional Knowledge**

The study also used the personal professional knowledge of researcher. By training, the researcher is an agronomist. I worked on promotion of goat based livelihood for poor in central and western Rajasthan for three years. I was a pioneer in testing a Farmer Field School approach in goat farming with poor farmers. I also involved in dispersing and extension this FFS approach to bordered state like Madhya Pradesh and Gujarat. Field staff of Gujarat based NGO also came to see this model and some component of this approach have been adopting. I developed a manual for goat farmer on this model which is being circulated to NGO.

## **2.8 Limitation of this study**

This study concentrates in one sample village on sustainable livelihoods through intensification of goat farming. The findings of this study may not applicable to all areas where goat is being reared. In area wise, this study has covered one study village, whereas the goats rear not only in Rajasthan but also other part of the world.

The key challenges which I faced during collecting primary data are the presence of women as a respondent in data was few numbers. As that time most of rural people were very busy in agriculture work including women were busy in weeding, hoeing activities. Subsequently, representation in study is negligible. The study could capture more experience if women participation were high.

The researcher biasness could be seen in study that I had been worked on same theme for long time, some time researcher asked lead question which lead to answer which researcher wants to know, it could not avoid much during data collection process.

The study also had a draw back in collecting data regarding their income from goat farming activity and from all other activities was that it was not calculated on any mathematical formula while figure of income in this study is used just an roughly idea or on memory based.

## **Chapter: 3 Theoretical Background**

### **3.1 Introduction**

This chapter discusses and documents the theoretical perspective of livelihood strategies, technology adoption and role of institutions or stakeholders of livestock. In livelihood strategy aspect, the chapter discusses about mainly goat farming as a livelihood diversification strategy, significance and current debate of agricultural intensification and outcomes of livelihood strategies. Technology adoption aspect is dealt with theory of innovation diffusion, innovation decision process. Role of institution aspect is also explained about current performance of public institutes and private actors, civil society. Finally, a brief description of analytical framework will be presented.

### **3.2 Goat farming as a Livelihood diversification strategy**

Livelihood diversification refers to attempts by individual and household to find new ways to raise income and reduce environment risk, which differ sharply by the degree of freedom of choice (to diversify or not), and the reversibility of the outcome' (ibid).

The study believes that goat farming is a livelihood diversification strategy to attain sustainable livelihood for poor household in semi-arid area. Hussein and Nelson (1998) claimed that livelihood diversification encompasses not only off-farm but also on-farm activities. Goat farming also considered as an on-farm activity in this study. In semi-arid area where uncertainty and risks are prevalent. In that context, scope for off-farm activities remains limited as low market opportunities, low skill regarding off-farm based activities except stitching activity for women. Furthermore, agriculture production is predominant activity in rural area, but erratic rainfall, depletion of ground water, and fragmentation of land are limiting to agriculture work. In this situation, goat rearing remains single activity which can raise income and reduce environmental risks for small scale holders.

In exist literature of livelihood diversification, the principle motivation factors for livelihood diversification are push and pull factors. The push factors are environmental risks and falling income where as pull factors are changing terms of trade, perception of improved opportunities. Ellis (2004) clearly distinguished between pull and push factor that pull factor correspond to improving market condition and push factor refers to deteriorating condition of agriculture sector. In addition of that, the fundamental causes of livelihood diversification in semi-arid area particularly in rural Rajasthan are unpredictable environment condition or drought and improving market conditions especially rising meat price due to increasing demand of meat products among non-vegetarian meat. Thus, the goat farming have been moving to adopt by many rural poor household as diversification livelihood strategy through using intensify the goat rearing activity to secure livelihood.

### 3.3 Significance of Agricultural Intensification:

Agricultural intensification occurs in twofold: first, increased demand of output of agricultural products, second, reduces the availability main factors like land, water and livestock, even if demand does not increase (Carswell, 2004). Increased demand may be due to increase population growth and could be increase of income of middle class in Third World countries as a result. And finite natural resources fall also because of blind use of it. Therefore, technologist and scientists brought two type of technologies, first is labor-saving technology, it denotes save the labor which did not succeed much in developing countries since labor is not a concern in these countries, rather crucial issue is to save the land. Second is land-saving technology, land saving technologies improved the yield per unit of land area. These technologies have been greatly succeeded in Asian countries particularly in India and Pakistan. During Green Revolution era, land saving technologies like chemical fertilizer, high yield variety seeds used.

Within agricultural intensification frame, there is a hot debate on environment and population has been going on in available literature. The debate is about growth of population is deteriorate the resources; Malthus (1798) argued that where population increases were not subject to check because population increases exponentially and production increases arithmetically. Malthus (further argued growth of population can check by natural disaster like famine and also can check by epidemic diseases. He also elaborated that because of increasing of population and not increasing of food production as per requirement of population, in such situation, he pointed out that using new methods in order to increase the production, it would be by chance it will increase, because growth population induce labor supply and food demand, and conversion ratio of labor and land into food diminishing which is inevitably bring people not to do production. Some Malthusians argued that population growth rate is so high as such condition it is impossible to maintain adequate food supply and decline of environment is inevitable (Cited in Carswell 2004).

In contrary, Boserup (1965) argued that increasing population pressure provides primarily stimulus of adopting innovation and intensification. She further explores that key responses to increasing population pressure are intensity of cropping pattern and land-saving technology. She has defined agriculture intensification as 'the gradual change towards patterns of land use which make it possible to crop a given area of land more frequently than before.'

(Boserup 1993: 43). She emphasized historical perspective on primitive agriculture that initially people neither do not use of hoe and plough, secondly, people started hoe to cultivate the land. Thirdly, they started to use hoe and plough. It was long process to come from without tool to cultivate farming with plough at the same time it happened because the population was increased gradually. His argument is valid in present context, for instance India is second largest populated country in the world and it able to serve food to its growing population due to intensify agriculture which has been applying with various modern technologies since 1960s.

Some Pessimists adherent that poor people cannot gain benefits from technology or commercialization in real world. Conversely, Binswanger and Braun (1991) argued in optimistic view that normally, technological interven-

tion and commercialization stimulate agriculture growth, enhance the employment opportunity and increase food supply, which all are central of poverty reduction. They have given two empirical evidences to support their argument; one is milk dairy cooperatives in India where small scale holders got benefits of intervention of technology especially artificial insemination in improvement of livestock's breed. Second, vegetable cooperatives in Guatemala where poor people reap benefits of technological changes and collective concept. Scoones viewed when he commented Wint and Braun's discussion paper that 'a pattern of intensification in farming is evident'. The intensification can be seen at rich farmers' farm and at commercial entity, very rarely we can see at poor farmers' farm because they are still do not access, afford, and accept the modern technologies.

### ***3.3.1 Brief description of technologies***

Roger (2003:12) defined 'An innovation is an idea, practice, or object is perceived as new an individual or other unit of adoption. If an Idea seems new to the individual, it is an innovation'. Roger who was given this theory is used word 'innovation' and 'technology' as synonyms. This study will be used technology in entire discussion and analysis rather than innovation. A technology is design for instrumental action that reduces the uncertainty in the cause-effect relationship involved in achieving a direct outcome. A technology usually has two components: one is hardware aspect; consisting tool that embodies the technology as a material or physical object, another one is a software aspect, consisting of the information base for the tool.

Theoretical, it is very necessary to clear which technologies will be analyzed in this paper since several technologies are being used by farmers in goat sub-sector. In this paper, any vaccine, any de-wormer, dairy cattle feed and Bardizo castrator will be studied. These four technologies which can categorize in twofold: bio-chemical and mechanical technology. Bio-chemical technologies are vaccine, de-wormer and purchased feed (dairy cattle feed). Bardizo-castrator can be described as mechanical technology. Furthermore in an economist view, these technologies can again define labor-using technologies, not labor saving technologies since all technology need labor right from production to consumption and administration at consumer level.

## **3.4 The factors and concepts of technology adoption**

Technology adoption is required precondition such as access, acceptance and affordability of technology. 'Access to technology, including affordability is required first step of adoption. (Hefferman et al. 2010). Affordability which indicates capacity of purchasing of a person which is also key factor to adopt technology. Despite an individual have a strong attributes to adopt technology, but this individual do not have affordability, thus affordability play a vital role to adopt technology (Hefferman and Misturelli 2000). They evaluated veterinary delivery services on the basis of access, acceptance and affordability, found out that access to technology is primarily more concern than affordability. Some of people often willing to pay for curing treatment of animal, but huge concern are that they cannot access to animal healthcare in their proximity.

ty in developing countries. In addition, key issue is that why the technology adoption among poor farmers does not satisfactory. In addition, Mekonnen et al. (2010) recently studied in Ethiopia and admitted that adoption of dairy technology among small holder is unsatisfactory. Moreover, it is heavily dependent on family size, gender, level of farmer's education and location of farm.

Economies of scale influence to take decision to adopt the package of technology among goat peasants. As the size of goat flock is varied from peasant to peasant. Within this situation, some peasants who have large size of goat herd, they can easily adopt technology because when someone operates technology at small scale then cost would be increase; subsequently in most cases low small scale farmer would restrict to adopt the technology. Thus, economy of scale doe matter to adopt the package of technology in goat production system.

Access to credit is imperative components to improve productivity of goats. Credit needs to buy technologies which includes feed and fodder, prophylactic measure (vaccination, de-worming), improvement of goat breed through using castration method. There is a huge concern that most of goat peasants do not have credit sources except to sell their goat herd. Although they have to sell their goats to purchase feed and fodder not only in drought condition but also in normal crop production year. Dossa et al. (2008) confirmed that the financial role of small ruminant is significant beneficial at rural household level where no access to credit and little chance to do off-farming income, within household particularly women because they are more engaged in rearing goats.

Furthermore, 'Diffusion is a process in which an innovation is communicated through certain channels over time among the members of social system. Further explained diffusion as the diffusion is a special type of communication in which the messages are about a new idea. This newness of the idea in the message content gives diffusion its special character. The newness means that some degree of uncertainty is involved in diffusion. Diffusion is a kind of social change, defined as the process by which alteration occurs in the structure and function of a social system. When new ideas are invented, diffused, and adopted or rejected, leading to certain consequences, social change occurs (Rogers 2003:5-6)'.

The study will focus diffusion perspective in its analysis using combination of orthodox sustainable livelihood framework and a model of five stages in the Innovation –Decision process.

'The innovation-decision process is the process through which an individual (or other decision-making unit) passes from first knowledge of an innovation, to forming an attitude toward the innovation, to a decision to adopt or reject, to implementation of the new idea, and to confirmation of this decision' (Roger 2003:169).

This process has five key stages: first is Knowledge which consists characteristic of the decision making unit, in this study decision making unit is a household of goat peasant will be analyse. Characteristic of goat peasant's household in rural setting mainly comprises socio-economic attributes, Second, Persuasion stage in which mainly will be examined economic relative advantag-

es, compatibility, complexity perception of technology package. Third stage is decision which crucial in this study which comprises adoption and rejection of technology. Fourth and fifth stages are extended stages of prior three stages namely implementation and confirmation Heffernan et al (2010) founded by using diffusion theory as a theoretical framework in their study is that adoption of vaccination to livestock influenced by socio-cultural grouping –age, gender, income, education level rather than cast. The scholars concluded that it can be improved the rate of adoption of vaccination through strengthen the institutes which do transfer of technology or knowledge, and both recognize to social system and local livestock knowledge system. The study has been used age, social status, education status, and livelihood resources as a socio-economic status for analysis. Without understand these status, the paper cannot generalize. As the status vary from person to person and context to context.

### **3.5 Government Institutes and other stakeholders of livestock sector**

Since 1991, after adopting liberalized economy by government of India, many public services sectors opened for private sector like artificial insemination, drugs and input supply in livestock sectors and so on. Jothi laxmi et al. (2011) strengthen above fact that ‘Structural changes (namely Liberalization, privatization and globalization) initiated by the central and state governments from 1990s onwards started to restructure the government services in all sectors. In the pre globalization era the major service providers are government owned state level animal husbandry departments and the quasi government organization namely dairy cooperatives.’ As a result, private actors like BAIF<sup>3</sup> has been playing crucial role to improve quality of breed particularly large animals. The BAIF developed a model on community based animal health worker especially for livestock breeding services. They are operating self-sustainable model means they are being taken service charge from farm community as government support is cut down. JK trust gram vikas Yojna also have been engaged in providing services through build the capacity of local youth and provide all technical know- how regarding livestock breeding , prophylactic. In poultry, private sector has already been involved right from producing of chicks to serve chicken to consumer. Nevertheless, the goat rearing is still deprived to provide breeding, prophylactic measure like vaccination, de-worming, even though goat rearing is an emerging one of the most alternative to pursue livelihood for the rural poor. There is an urgent need to understand deeply how can improve supply of technology and demand in this sector to enhance the productivity of extensive goat production system.

In rural India, institutional mechanism to transfer of technology from lab to field is poor. Empirical studies shows that Kumar (2007) analyzed that there is no concern of availability of technology to improve productivity of

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<sup>3</sup> BAIF (Bhartiya Agro Industries Foundation) Foundation development and research is a national non-profit public trust which has expertise in community based livestock model



goat farming, the main issue is that no support system to provide quick and latest information regarding technological practices in goat farming even large farmers who operate in intensive and semi-intensive goat production system. Empirical data of his study shown that, commercial goat farmer eager to adopt technology, but they could not adopt all technological practices especially preventing diseases, including internal and external parasitic diseases. Therefore, one of Indian state government has been began work on to strengthen the institutional system as well as ICT system. Recently a study conducted in Orissa in order to test and design demand led Livestock Guru Software. Lin and Hefernan, 2010 found out livestock keepers are marginalized in terms of getting information regarding to care of their animals in developing countries since social barriers namely gender and cast are exist. In their study, women and lower cast keepers were more deprived to access accurate and effective information as they have many barriers like to attend public meeting for women and lower cast people do not much outside exposure due to poverty.

### **3.6 The Sustainable livelihood approach to impact of technology**

‘A livelihood is sustainable when it can cope with recover from stresses and shocks, maintain or enhance its capabilities and assets, while not undermine the natural resource base’ (Scoones 2009:175).

Within literature of orthodox sustainable livelihood framework, more clearly conceptualize that ‘Sustainable livelihoods are those that can avoid or resist such stress and shocks and /or that are resilient and able to bounce back household portfolio of tangible (stores and resources) and intangible (claims and access) assets can be understood as partly chosen by design to reduce vulnerability to enable the household to survive stress and shocks with minimum risks of threat to the future livelihoods. Moreover, reducing vulnerability has two dimensions. The first is external through public action-to reduce external stress and shocks through flood prevention, disaster preparedness, off season-public works to provide empowerment, prophylaxis against diseases. The second is internal through private action, in which a HH adds to its portfolio of assets and repertoire of responses so that it can respond more effectively with less loss. (Chamber and Conway 1991:11)’.

Outcomes of this framework are important part of this framework to explore poverty reduction and sustainability dimensions. The key outcome of the framework encompasses livelihoods (Increase employment, reduce poverty and increase well- being) and sustainability (Reduce vulnerability, adaptability and resilient and sustainability without any natural resource sustainability).

Key concepts which are being analyzed in this study are: reduce vulnerability, reduce income poverty and improvement of natural base. Today, Poverty can understood unlikely to vulnerability, Poverty ; economists have defined in two terms one is absolute term means, people cannot meet fundamental needs like shelter, food and clothes to live . Second, people cannot meet out basic services like health, education, but they can fulfill fundamental needs (poverty line). ‘Vulnerability refers to proneness to a sudden, catastrophic, fall in the level of a variable, usually interpreted as access to enough food for sur-

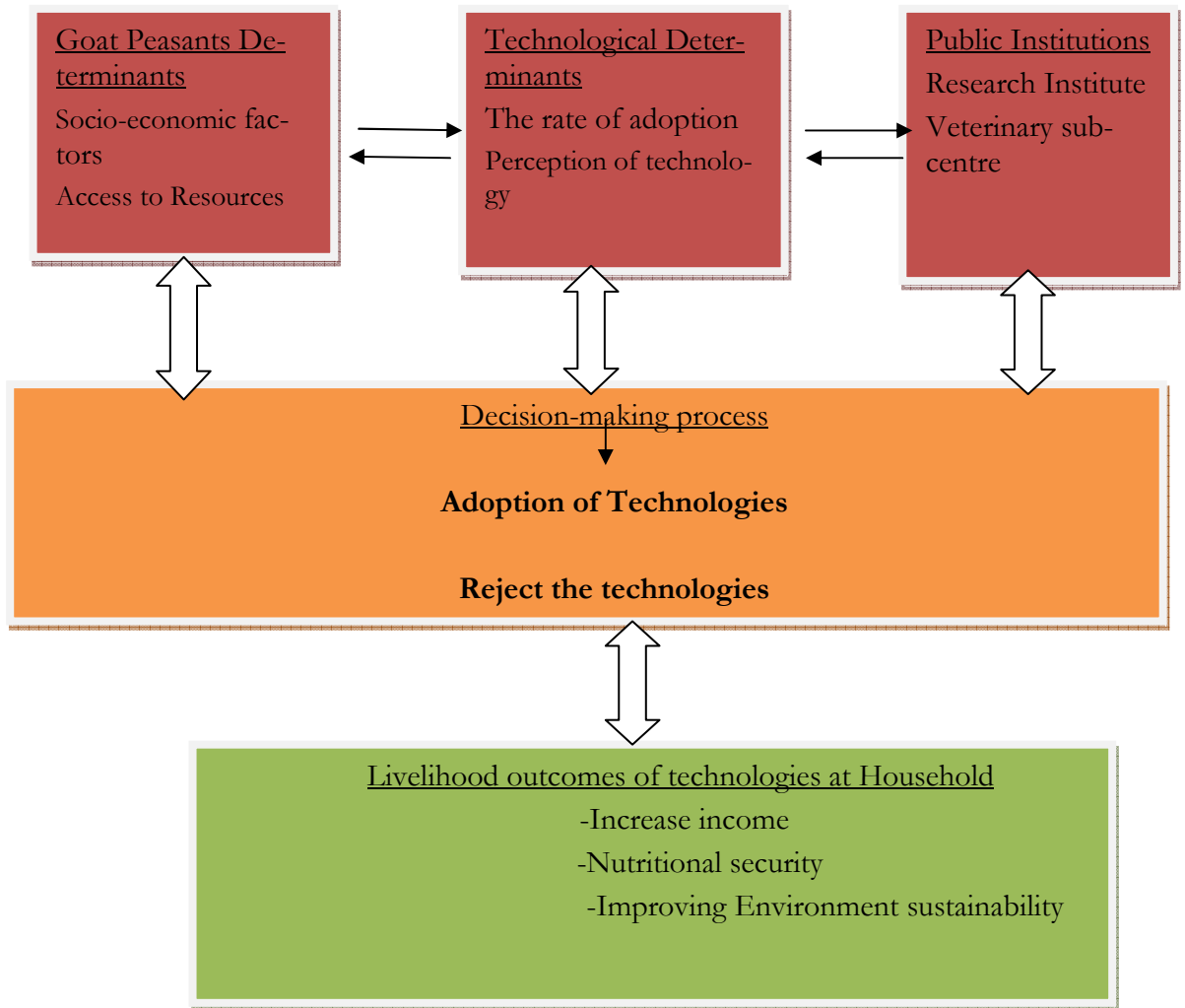
vival' (Ellis and Freeman 2005:6). Furthermore, vulnerability can be reduced through minimizing the risks. Risks can be of two types: first is external like state policy of production, epidemic diseases, and drought. Second is internal risks for instance physical and mental disability, social ceremonial economic burden and so on. These risks often occur in an uncertainty environment. In order to respond to these risks, poor people diversify and intensify their livelihood's activities and some people migrate to urban areas. In livelihood discourse many studies have found out that moving out from poverty is a cumulative process, although it is a tiny increment at poor household. Similarly, Conway (1985), Holling (1993) and others (as cited in Scoones 1998: 6) that 'natural resources based sustainability refers to the ability of a system to maintain productivity when subject to disturbing forces whether a 'stress' (a small, regular, predictable disturbances with a cumulative effect) or a 'shock' (a large infrequent, unpredictable disturbances with immediate impact)

Livelihood approach is applicable in all sectors such as livestock, fisheries, livestock, fisheries, forestry, agriculture, health, urban development and others (Scoones 2009). This approach attempted to apply in goat farming which is a sub sector of livestock.

### **3.7 Description of analytical framework**

This analytical framework (figure 1) is primarily based on sustainable livelihood approach. The analytical framework is explicitly a combination of sustainable livelihood approach and diffusion theory. The study will be analyzed through three key dimensions through this framework. First, determining factors are taken from innovation diffusion theory (Roger 2003). These factors encompass various variables in which some are hinder and some promote to adopt technology to pursue sustainable livelihood will be analyzed. Second, determining factors are associated with technology; peasants and institutional and organizational process will be analyzed in process of making decision to adopt technology to attain secure livelihoods among peasants. Third, outcome is an imperative aspect of this framework in which, the study will look at how peasants attain livelihoods in both perspectives of technology adopters and non-adopters in same context, determining factors and various process which happened during to take decision for adoption of technology.

**Figure 1: Analytical framework**



Source: Author's own construction

## Chapter 4 Explaining Patterns of Technology Adoption: Findings from the Field

### 4.1 Introduction:

The chapter consists three key sub-sections. First, determining factors to adopt technology and reject to adopt technology in micro-study. Second, to analyse and explore the government institutional mechanism of delivery of technology particularly goat husbandry. Thirdly, to analyse the outcomes of technology adoption on sustainable livelihood for goat herders.

### 4.2 Key determining factors to adopt and reject to technologies adoption

#### *4.2.1 Categorization of goat peasants and current pattern of technology adoption*

Prior to go determining factors, it is quite necessary to understand the categorization of technology adopters and findings of current pattern of technology adoption for better understanding determining factors. The study categorized goat peasants on the basis how many technologies are they adopted. The technology consist four key technologies namely vaccine, de-wormer, dairy cattle feed, use of Bardizo castrator. This study assumed that all key components are equally important for improvement of productivity of goat. Since technology adoption is vary from farmer to farmer in a same village. The research categorized of farmer into four categories on the basis of how many technologies adopted each household.

First, four technologies adopters who adopts all four technologies at their goat household in practice known as four technologies adopter. Second, farmers who adopt any three components of technology adopted called three technology adopter farmer. Third, one-two technology adopters who adopt any two or more than one technology adopted. Fourth, farmers who no one technology adopted, the study defined as a zero technology adopter.

The current pattern of adoption of technology is satisfactory. The data show that majority of goat peasants in this sample village adopted technology. How many technologies have been adopted by majority is crucial issue to know. Around one third peasants adopted all four technologies, while less than one fourth goat peasants adopted no one technology. Moreover, majority of goat peasants (42%) adopted one to two technologies, whereas three technology adopters are least percentages (14%).

**Table 1: Pattern of technologies adoption among goat peasants**

Category of technology adopters	Number of respondents	Percentages
Four technology adopters	13	27
Three technology adopters	07	14
One- two technology adopters	20	42
Zero technology adopters	08	17

Source: Elaborated by author from Survey data, this was done from 21 to 25 July 2011

#### **4.2.2 Socio- economic characteristics**

##### **Age group of head of household:**

The rate of adoption is higher among in age group of 31-40 years since this age group was quite young while ISGP team was diffusing the goat development technology at sub-centers and villages. Secondly, young age group that is 20-30 years are not much willing to do goat rearing as an enterprise, they do just as a time pass, it reflects from data (Table no. 2) that 43% young age groups are traditional or they are not adopting single technology while, many research study shows that youngster adopt technology earlier than older than them. In other words, there is a negative interest prevalent doing goat rearing among young age group peasants.

**Table.2 Age group of head of Households**

Age group	Four technologies adopters (%)	Three technologies adopters (%)	One-two technologies adopters (%)	Zero technology adopters (%)
20-30 yrs	15	15	5	43
31-40 yrs.	62	57	35	29
41-50 yrs.	23	14	25	14
More than 50 yrs.	Nil	14	35	14

Source: Elaborated by author from Survey data, this was done from 21 to 25 July 2011

In fact, the future of goat breeding development depends on coming generation particularly, what they want to do for their career. The result of survey shown that 42% respondents accepted definitely their kids will not become goat breeders. On the other hand, negligible respondents or very few of respondent (hardly 2%) have opinion that their kids will become goat breeders.

Similarly, the majority of goat breeder have aspiration from their kids that they will do study and will get government employment where as some of respondents are also believe that they will go to near- by city and work as a labor, but not much people accepted that goat breeding will be promote at their own villages.

##### **Social categories of household:**

All technology adopters were distributed among all groups of social groups. It does not show that the technology is adopting only one social group. The table no. 3 shows that other back word cast encompasses Gurjar, Daroga, Jat, Lu-har, Mali are relatively resource full and more literate than Schedule cast group. Gurjar community also known as pastoralist community in Rajasthan, they focus in their livestock to improve through technology. Recently, Jat community is focusing on goat rearing because they believe goat keeping is an ultimate

source of livelihood in adverse weather conditions and demand of market. Subsequently, the rate of adoption is relatively higher among OBC social group than Schedule cast group. The highest four technology adopters are belongs to OBCs that is 77% and lowest belongs to Schedule cast which includes Kahtik, Meghwal, Bavari are 8%. Similarly, General social group consist Brahmin, Rajput, Vaishya. In Hindu feudal social system, the general group has highest rank in terms of forward and empowered socially, economically in the society. Brahmin and Vaishya cast believe that goat rearing is a sin in terms of violence; they favor a concept that is non-violence. Very interesting point found in one interview, the interviewee was belongs to Brahmin social group, he narrated a short story 'his family once upon a time reared one goat, the goat was produced two kids one was male and another female. What they did with male kid was that they exchanged male kid to female kid to other farmers who do not belongs to Brahmin community, because they have superstitious or orthodox belief that if they sell male goat kid to trader for meat, it is a sin, so we don't want to earn sin in our life. Such type of orthodox belief leads to destroy not only adoption of technology but also the will power of rearing goats among goat herders. Most importantly, such type of group is relatively in number very less.

**Table 3 Distribution of technology adopters among in different social categories**

Cast/ class	Four technologies adopters (%)	Three technologies adopters (%)	One-two technologies adopters (%)	Zero technology adopters (%)
Schedule cast	8	29	10	43
Other back word cast	77	57	75	57
General	15	14	15	Nil

Source: Elaborated by author from Survey data, this was done from 21 July to 25 July 2011

### Education status of goat peasants

Successful story of green revolution in India (1965-85) concluded that the rate of technology adoption was highest among more literate farmers. The data of this study also verified that education is a tool to adopt the technology especially in rural areas where various socio-economic and cultural constraints embedded in society. The table no. 4 shows that literate peasants were most adopter of goat development technology, as technology itself is complex; it needs requisite qualification to adopt it. Most important finding in this table; we can seen that very little percentage of secondary pass peasant involving in this activity and no one from more educated even in four technology adopters category, it contradicts higher educated people do not do goat rearing at village level, although goat rearing is growing activity for livelihoods. At the same time, around third quarter of total zero technology adopters are illiterate, it is also validate personal interview with zero technology adopters in goat farming who narrated as 'Being illiterate people reluctant to adopt package of goat technology because of they live in persisting poverty, since they have to obey social evils like death feast, early child marriage'. These social ceremonies are one of key factor to expel in poverty cycle. The reason is that to organize the social ceremony they have to spend a lot of money which often over from their financial capacity. This money they often borrow from money lender and merchant at high interest rate. As a result, one of adult member of our family often has to migrate owing to repay this borrowed money. In such situation, at

their home old aged members and female remains and they are not able to go outside and learn things and adopt the technology.

**Table 4 Education status among goat peasants**

Education	Four technologies adopters (%)	Three technologies adopters (%)	One –two technologies adopters (%)	Zero technologies adopters (%)
Illiterate	15	43	45	71
Literate	46	28	40	29
Up to 8 <sup>th</sup> Standard	23	29	10	Nil
Secondary pass	8	Nil	5	Nil

Source: Elaborated by author from Survey data, this was done from 21 to 25 July 2011

#### **4.2.3 Access to Resources**

Numbers of goats, Land, human resources, common property are key resources which influence to take decision to adopt the technology under rural context.

##### **Number of goats at Household:**

Goat flock size was observed that it is a main factor which determines to adopt technology. Tab. No. 5 clearly shows that majority 55% farmers who have a largest size of goat flock adopted technology while, smallest size of goat flock peasants were reluctant to adopt technology. The economies of scale is a long term concept, that in small size of goat flock the cost of per animal would higher as in large goat flock size because an average cost of input would fall if scale of unit size increase. Subsequently, average cost of technologies is high in small size of goat flock that's why smaller goat herder reluctant to adopt technologies. Another reason is no one peasant depends exclusively on goat farming for their livelihood in this case study, while they were dependent on other livelihood activities like rainfed farming, daily wages to urban area as well as MNREGA<sup>4</sup> at local. Kumar (2007) also suggested same line 'the minimum no. of breeding goats in a commercial unit should be 50 to make do it a self-sustaining unit that can provide livelihood to at least one household'. Thus, most important aspect is that most of peasants take it as a subsidiary and additional income sources, not a commercial entity.

##### **Access to land**

Land ownership as a resource with peasants positively influenced to adopt the technology. Those farmers who have land up to 1 ha. And another category that has more than 2 hectare land was most technology adopter as land holding is a social status in rural area. To maintain its social status they adopt technological driven practices. On the other hand, land less goat peasants are more vulnerable than others who have land, they have to do share cropping and wage labor and so on, in theoretically they have to adopt technology, but in practice-

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<sup>4</sup> MNREGA stands Mahatma Gandhi National Rural Employment Guarantee Act 2005 has been enacted in across India by national government and local government to ensure social security as well as provide an opportunity for 100 days employment a year per household in rural area.

es , it is not happen as same because other various factors indebtedness, vicious cycle of poverty.

**Table. 5 Resources owned by goat peasants**

Resources owned by peasants	Four technologies adopters (%)	Three technologies adopters (%)	One-two technologies adopters (%)	Zero technologies adopters (%)
Goat flock size				
1-5 goats	27	28	26	43
6-10 goats	18	29	37	43
11-30 goats	55	43	37	14
Land ownership (ha.)				
Land less	17	Nil	9	14
Up to 1 ha.	42	15	27	29
1.0-1.5 ha.	08	14	18	14
1.6-2.0 ha.	08	14	09	14
More than 2.0 ha.	25	57	37	29

Source: Elaborated by author from Survey data this was done from 21 to 25 July 2011

### Available Human Resources:

In extensive goat production system, grazing of goat is a cornerstone activity. In this activity, old aged people of household, kids and very low proportion of adults has been contributed as human resources particularly open grazing of goats. The open grazing is a source of employment for unskilled people. In contrary, the open grazing is being spoiled life of many of young kids who never ever go to school in their life owing to go for goat grazing. As tab no. 6 shows that 33% respondents accepted that their kids are being involved in grazing their goats. Similarly, Second largest proportion that is 29% old aged people of household play vital role to support as a labor for grazing their goats. In principle, it is also a key reason of low adoption of technology among goat peasants that old aged people and kids are actively involved in grazing and other activities.

**Table.6 Distribution of human resources engaged in goat rearing**

Particulars	Respondents	Percentages (%)
HH's old aged	14	29
HH's kids	16	33
HH's adult people	09	19

Source: Elaborated by author from Survey data this was done from 21 to 25 July 2011

### Access to common property resource for open goat grazing

The study found that goat farmers have 6500 hectare area which quite good common property resources in this particular study area. This CPR area having a long tract of ARAVALI hills which is accessible for open grazing for all goats and other animal as well on certain rules and regulation of department of forest and at some cost which being charged by department of forest. The fee which is being charged by department of forest is contested because all interviewee pay different amount, it ranges Rs. 1.5 -5.0 per goat animal per annum which is not big amount. But, here issue is that something is wrong with small amount of fee with poor farmer. It seems a little corruption involved to collect fee. The key regulation and rule is not to cut tree even not to do pruning trees. In the view of interviewees, Pruning must be doing either forest department or selected farmers at some cost, so that after pruning, the growth of tree would be double. They also agree on do not cut any tree and shrubs. They also appreciated one rule of forest department is that one month of rainy sea-



son that it could be July and August; ban to go goats into forest for open grazing.

Some proponent of environment asserts that the goats harm to forest, interviewees contrast to this statement, they argue that what you will do with this forest, if poor people do not graze their stock.

#### ***4.2.4 Personal variables of goat peasants***

The question is that why all rich peasants do not adopt technology while only some of advance peasants adopt it. It is not universally true that only resourceful people adopt technology therefore, this study argued that since each person has different attributes and values which allow adopting technology to some rich resource peasants, but not to all. It is very essential to have personal values or attributes which allow a person to choose as an option of technology.

The key personal variables are empathy, dogmatic, fatalistic, rationality, intelligence, knowledge, higher aspiration, self –motivation. These values are analyzed as:

##### **A). Empathy:**

The study data shows that an empathetic person adopted technology very earlier than others. ‘Empathy is an ability of an individual to project himself or herself into the role of another person (Roger 2003: 289). One depth-interview which I had an interview with an interviewee who has 175 goats, 130 bigha land (32.5 Hectare) and also I would say he is a change agent for this village particularly in goat rearing. ‘I always project myself into the role of others. Today, I feel proud on technology which helped me and other my fellows which bring change in our life.’

This interviewee person is getting around 60 years age, most interesting thing which I found was he is still believe that I want to be this goat husbandry should promote with package of required technology. Thus, anybody who has empathy can be brought change in a society.

##### **B).Dogmatic:**

Dogmatic peasants are less adopter than non-dogmatic person. “Dogmatism is the degree to which an individual has a relatively closed belief system, that is, a set of belief which are strongly held” (Roger 2003:289). The data proved this theoretical assumption that an interview which I held with an average goat peasant who has 20 goats, 8 bigha (2 hectare) lands, out of three technologies he has been adopting since last decade. He is a very dogmatic in one technology that is castration of bucks. The interviewee never ever did castration of buck even though he know that I can earn more after castration of buck, I can sell bucks on occasion of Eid and get more profit. But I cannot do , because I believe that ‘ the process of kassi or castration does not allow me as some bagraia community people who do often with knife or sharp razor blade, in this process a lot blood release, so that condition for me being a goat owner is very painful’. When I attempted to validate this data, technology adopter focus group also stressed that we do also feel same emotions. However, we do not have another option except to call bagraia community people who do this

practice at Rs.20-30 per buck. This process which they do is very painful for being a goat herder. Some farmer also accepted that scientific method which is done by trained people is quite useful because in this process no bleeding and no risk of tetanus disease. Thus, it could be said that do not ignore local practices and belief which is prevalent in practice during formulation of technology development policy for goat herders.

### **Social relationship and network**

Group interview verified that most of members of group asserted that we adopt technology from our friends, relatives and neighbor 'learning by doing' principle. As we live in same village and meet each other very frequently. Our religious ceremonies, festival are good source for gathering and we discuss experiences related to technology adoption. But, at present, we do not have much aware about new technology because no one comes here for transfer the technology.

#### ***4.2.5 The rate of technology adoption***

The study is described four main technologies to improve productivity of goat production system. Vaccine, De-wormer (to kill internal parasites), dairy cattle feed and use of bardizo castrator (to make sure pure breed and for fattening buck rearing) have certain perceived attributes such as relative economic advantages, complexity, compatibility which determine to adopt technology or reject to adopt technology.

In spite of lack of support from government functionaries, data in table no. 7 shows that respondents adopts technologies as most of they perceive that these technological products are relatively economic, and better than traditional practices. Dairy cattle feed is highly adopted which by 70% respondents in this sample, ET-vaccine and e-wormer which are crucial to prevent diseases and reduce risk. ET-vaccine is being adopted by 66% respondents and 56% respondents adopted de-wormer. The reason why they were able to do so. Focus group interview narrated that 'we have alternative way that is Para- veterinarian to administer the vaccine at reasonable cost'. The study explored that two para-veterinarian are being practiced in this village and around the village.

Only use of bardizo –castrator is being adopted by less than one fourth population of sample size as this method need specific skill and also it is quite expensive and other social stigma are attached with this method.

Data of focus group also validated this data that 'these practices reduce the disease to occurrence, and improve the breed the package of technology never would harmful; it means the package of technology is better than traditional practices'.

**Tab.7 Distribution proportion of technologies adoption among respondents**

Technologies	Respondents	Proportion (%)
ET –vaccine	32	66
De-wormer	27	56
Dairy cattle feed	34	70
Use of bardizo –castrator	11	23

Source: Elaborated by author from Survey data which was done from 21 to 25 July 2011?

Empirical data of this study slightly opposed to the previous study findings. For instances, Kumar (2010) mentioned results of his findings that in Rajasthan 3-6% goat farmers used ET vaccine and HS in very small and small category, and 9-32 percent farmer used de-wormer against internal parasites. The study has explanation for Kumar's (2010) study data that his finding shows only for small and very small farmers, but present study provide data for all four category of goat flock size (from very small to large goat flock size). Second explanation is that Kumar's findings are more generalized for a state, but the study cannot generalize as it is a case study.

#### ***4.2.6 Lack of access to Technology***

Access to modern technology depends on information providers on which farmers rely, such as progressive farmers, input dealer and radio, training, friends and relatives and television. Group interview with technology adopter group data said that 'we are mostly depends on input dealer to get information and even for buy vaccine, de-wormer, feed as input dealer can accessed' (Ministry of Statistics and program Implementation, GoI 2005) report shows that at national level around 40% household access to technology. The survey report canvassed sixteen different source of modern technology for farming, the progressive farmer was the most popular source which constitutes 17%, and next service providers are input dealer and radio which have 13.1 and 13% respectively. In contrary, Non-adopter group of interview data said that 'the access to technology is one of the most important reason for unwilling to take up the technology as we cannot access easily to Input dealer and radio even progressive farmer.' In light of the data, progressive farmers, input dealer and radio are significant source of diffuse the technology which is pre condition to take decision whether adopt or reject the technologies.

#### ***4.2.7 Lack of trained Human resources at local level***

In veterinarian science, it is a huge challenge to provide services to all animal farmers. Group interview members and personal interviewee asserted that the cluster of technology is usable but due to rule, regulation and act of veterinarian science says that untrained people cannot administer the vaccine. Indian veterinary council act 1984 says that 'Minor veterinary services means the rendering of preliminary aid like vaccination, castration, and dressing of wounds, and such other types of preliminary aid or the treatment of such ailments as the State Government may, by notification in the Official Gazette'. However, some of educated young farmer who took training from Centre for

Goat Research Institute , Makdhoom, Mathura on goat development , now they do vaccination only for their goats and also treat to others' goats .

Obviously, this issue is very complex specially administration of vaccine through sub-cut and Inter muscular methods into goat's body. On the one hand, department of animal husbandry is over loaded with vaccination work. On the other hand, they do not train to new people as per requirement.

In sum, one fifth of sample size does not adopt technology because they have different weak socio-economic attributes, some personal variables. While rest of significant number of respondents is being adopted technology, although the number of technology of adoption of technology is varied from household to household.

### **4.3 Role of Local Government Institutes in Diffusion of Innovations and delivery of services**

The purpose of this sub-section is to assess State Livestock development policy in general, goat development innovation policy in particular and its implementation at ground level or at village in perspective of field officials and beneficiaries. 'Innovation policy is the main driving force behind increase in production and productivity' (Brandt and Otzen, 2007: 120). This notion leads to reduce the poverty through increasing household's income. The innovation policy consist three key components adaption research, extension and training. This micro study would analyze three key components of policy namely training, extension and research for goat development and what is reality at local level.

The state innovation goat development policy argued that policy will enhance human resources and will develop their capability through imparting technical training and skills to poor goat peasants to get higher income through goat farming at minimum cost (Government of Rajasthan, n.d.). In contrary, data of study shows that there is a huge gap between innovation policy and its implementation in regard of the development of human resources and social capital and increase their income portfolio through best delivery of services and extension services, also adaption of research which means to provide the solution which suit in local socio-economic and environmental conditions. The analysis is on three key components as:

#### ***4.3.1 Role of research intuition in goat breeding technology transfer:***

The quantity of elite bucks which has been developed for breeding purpose at State Buck Breeding Research centre is very less. In an Interview, head of State Buck Breeding Research Institute narrated that 'as we have been reared 100-120 bucks a year and distribute to progressive farmers at breeding age which we scientifically consider one year old'. In fact, the population of goat in the state is 1.69 million (ibid), it means they are producing bucks very less num-

bers, neither this inadequate figure reach to all progressive farmer nor fulfill the good quality buck gap at poor peasants end.

The quality of developed Sirohi buck at Buck breeding research institute is skeptic since inadequate human resources are being employed and lack of financial support. As per same interviewee's view,

‘At present we have ten permanent staff including administrative staff and office staff. We are three veterinarians including me. It is quite doubtful that two VO only have to procure, in procuring process, they have to figure out pedigree record at farmer level and purchase at limited financial source. After procurement, these bucks’ do rear on available feed, most importantly we cannot serve green fodder to bucks as we have limited budget for fodder. Besides, bucks often go for open grazing in our huge spacious farm’s campus.’

This is clearly indicated that available technical human resources and allocated budget is insufficient to fulfill state requirement of good quality buck of sirohi breed. Subsequently, the rate of transfer of technology of breeding is slow in the state

#### ***4.3.2 Role of extension and veterinarian services institutes for technology transfer***

Human resources, basic infrastructure and gap between veterinarian and policy formulation are key factor by which technology not reached to farmers.

The data shows that deployed human resources at local sub-veterinarian are relatively very less in comparison of proportion of animal and number villages. An interview which was held with local veterinary officer works at Banwal Veterinary sub-centre, he narrated as:

‘At present , I myself works as a VO , no one staff except me at Banwal centre , and have to look after around 12-15000 animals in eight villages which are come under eight kilometer radius’.

Krupp (2003) asserted that the pattern of staff is dismal in India as the ratio of the 1 livestock personnel is to 12000 animals. It is a crucial concern to get success rapid economic growth in livestock sub-sector. It is therefore immediate need to understand this gap why is it prevalent, after getting long time independence.

Not only concern of less number of staff employed at veterinarian centers but also lack of functioning of field machinery. Field machinery or field staffs who is responsible for technology transfer from lab to field. Due to traditional system of government functioning, they do not function properly; even they do not do duty as per their rule and regulation. The focus group interview validated this fact, both focus group of technology adopter and non-adopter accepted that and elaborated that

‘We don’t know who is a VO in this veterinary sub-centre since even the VO does not come irregularly. In such context, we have to buy vaccine from Ajmer and for administration of vaccine we call to local Para-veterinarian’.

Both issues discourage to adopt technology at micro level where the goat industry is growing in own way. It is pre-condition to transfer of technology

that personnel and animal ratio must be appropriate and improve the functioning of deployed field machinery.

Lack of basic infrastructure such as refrigerator to keep vaccine, weighing machine and various tools affect the outcomes. The fact was narrated by local VO elaborated during interview with him as ‘we cannot plan large number of vaccine dose owing to we don’t have refrigerator, and do not have regular power supply at our centre.’ This data explored about lack of planning at state and district level which indeed, discourage to transfer the technology in field, even if someone want to provide services and technology to farmers, but cannot because of basic infrastructure. It could be said that planner and policy maker must be reviewed basic infrastructure at micro- level.

Policy maker and field veterinarian have always disagreement. Lipsky<sup>5</sup> (1980) mentioned that given that policies are often formulated by bureaucrats and expert that field veterinarian (Street bureaucrats of Livestock department) largely do not participate in such process, subtle tension exist between managers and field staff which compromise percolation of the policy mandate and efficiency of implementation. The data of the study that a local bureaucrat or street bureaucrat also accepted and stressed that ‘all livestock development policy formulated in air condition room, not at ground reality’. It could be mean that policy maker do not aware about field realities and they designed policies, and we have to implement it which is some time creates tension between street bureaucrats and community. This is also has to consider during designing of livestock development policy in order to transfer of technology.

#### ***4.3.3 Role of trainings and exposure for technology transfer***

An orthodox training and visit approach always does not fruitful in terms of build the capacity of community in general, and transfers of technology in particular. In this approach, since the relationship between trainer and trainee is not cordial which often harm the whole mandate of training? As a result, the attendance of farmers as a trainee in most of the trainings remains low. This data was described by interviewee. Furthermore, the allocated budget for training is very low, ‘we can organize only 6-7 training per annum and no budget for exposure tour’. Nonetheless, best goat peasant said in his interview that,

‘I never ever attended in local trainings and I don’t know whether the department organize trainings or not. In such scenario, I sent my son to National Centre for Goat Research, Makdhoom, Mathura, UP for attending a 15-days residential training at own o cost, as I want to ensure to use all technological intervention like vaccine, de-worming, castration and feed blocks’.

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<sup>5</sup> Lipsky (1980) in his seminal work on street level bureaucrat opined that public service protocol and rigidity creates organizational sub-system and dehumanized tendency within field bureaucrat who function as the gatekeepers of the policy deliver.

Training is an inter-personal communication channel. The communication channel is an integral part of innovation diffusion theory. Thus, training play important role to transfer the technology and empower to human resources.

#### **4.4. Outcomes of technology adoption at household**

This study examine outcomes of technologies (ET-Vaccine, De-wormer, dairy cattle feed, scientific method of castration of buck) in relation to adopt of technology and rejection of technology at household in rural area. The study found that technology adopters are being pursued more secure livelihoods than zero technology adopters. The reasons are technology adopter can earn higher income because of low mortality and morbidity in their goat herd; secondly, they can attain more nutritional security as they can receive more quantity of milk and can sell their bucks at higher rate. Thirdly, technology adopter can more contribute in organic agriculture by using goat dung in their farm field than zero and other less adopter.

##### ***4.4.1: Increasing Income***

There is twin way to increase income through using a unified approach. A unified approach which consist a mix of diversification and intensification of goat based livelihood strategy which lead to secure sustainable livelihood at household in semi-arid area. First is fattening of bucks for kurabani market. Second is buck rearing for meat purpose in market. In such area, some of households adopt a unified approach in order to minimize risks in response to reduce vulnerability, but not others. Key observation of this study, those farmers who adopted unified approach in which what they did is apart from rainfed farming, they adopted goat farming as unified approach. To some extent, they attempted substantially to reduce their external and internal risks. But, others farmers do not adopt this unified approach; most of them have to migrate for a season and for long term and do daily wage in urban area.

In first approach, goat peasants' rear bucks for kurbani market. Kurbani market means simply bucks buy and sell for kurabani in the name of Allah or god on the occasion of holy Eid per year. The major kurbani markets in India are metro cities like Mumbai, Delhi and so on. <sup>6</sup>The researcher just roughly calculated the turnover is Rs. 7.2 million or \$ 0.16 million per year from surrounding eight villages who raise bucks for Kurbani.

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<sup>6</sup> The roughly calculation is entirely based on memory of a respondent. The calculation is one truck have a capacity to carry 120 ready bucks to market. The rate of one buck is estimated on experience base is Rs. 20000. The estimated total truck go to kurbani market in a year from this goat cluster is 30. The total amount would be Rs.7.2 Million. Secondly, Researcher calculated 1 USD is equal to INR 45 in entire paper.

In second approach, goat peasants rear bucks (male kid) and doe (female kid). Doe rearing do for breeding of goats to accumulate assets through multiplication of progenies. Another way of buck rearing is simply to sell in local meat market in any urgent household's need.

Tab. 7 shows that there is a clear distinction between technology adopters and non-adopters. Overall, technology adopters earn more income than non-technology adopter. The 41% technology household adopters have been earning Rs.21000-50000 (\$466-1111) a year which is on an average of \$1.22 to \$3.0 per day, (average return calculated at 365 day a year because goat production system is extensive in this study area so that goat peasant cannot take single day leave to grazing). Highest range of income is earned by around 5% including both income portfolios Rs.50 -100 thousand and more than Rs. 100 thousands. It could be said that it is also possible that goat peasants can earn significant amount of income which leads to well being and quality of life.

The data explicitly shows that non-adopters earn lesser than technology adopters. The majority of non-technology adopter (71%) which can earn Rs.5-10 thousands a year (\$111-222) and a day average is Rs.14 to 28 (\$0.30-.60) whereas, it is also significant that for who adopt technology only one product who also come under same category which is quite disappointed to rear goats in rural areas. In non-adopters, about one third proportion people are earned Rs. 11-50 thousands a year while after this range of income no one reached because of they are still doing goat rearing in traditional way which could be much profitable for them. Nonetheless, the study could not bifurcate on the basis of size of goats, and available resources, as this study primarily divided into two groups, one who adopts technology, second who do not adopt single one technology.

**Table 8 Distribution of increased income at household level**

Particulars (Rupees in thousands)	Technology adopters (%)	Non-technology adopters (%)
5-10	36 (15)	71 (5)
11-20	18 (7)	14.5 (1)
21-50	41 (17)	14.5 (1)
51-100	2.5 (1)	0
More than 100	2.5 (1)	0

Source: Elaborated by author from Survey data this was done from 21 to 25 July 2011

\*Parenthesis data denote number of respondents.

The data of focus group interview with technology adopter group emphasized that 'we often reduce our vulnerability through goat farming whenever our kids or family member fall sick, we can sell our male goat to trader, and also some time we want to buy input for crop production that time we can get access to income through selling goats at reasonable amount' These are symbolic ways to reduce the vulnerability at household.



#### ***4.4.2 Improving Nutritional Security***

In India, pre-schooling kids and lactating mothers is most vulnerable segment to under nutrition which is also recognized by government of India. <sup>74</sup>Over 50% of pre-school children and 30% of adults are undernourished as judged by anthropometric indices and over 70% women and children suffer from anemia<sup>75</sup> As goat milk is recommended by experts for infant and lactating mother because it is nutritive and easy to digest for kids. In rural setting, most of people do not buy milk because of lack of access to market and lack of purchase capacity particularly among the poor. Table 8 clearly explained that goat milk is being used by 83 % goat peasant's HH for domestic purposes and remaining 17% goat peasants are sold at local private dairy. In other words, the milk has been utilized to drink for children and lactating women as most of poor peasants cannot buy milk from market. In subsequently, the goat milk helps in enhance nutritional status among vulnerable segment. This data supported best goat peasant interview that ,the interviewee elaborated that 'at my home, at first we often make tea and drink goat milk , and remaining milk we sell at dairy' Thus, the goat milk is a supplementary source to provide nutritional requirement among poor households. This finding is also strengthened by other studies which were done in Gambia, Guatemala and Rwanda that admitted increased income through using technological intervention often translated in to food consumption and nutritional welfare of children. For instance, ten percent increase income at household it translated into a 3.5 to 4.9% nutritional welfare ( Binswanger and Barun:1991)

**Table 9 Use of goat milk at household**

Particulars	Number of respondents	Proportion (%)
use in domestic purposes	40	83
we sell milk at dairy	8	17

Source: Elaborated by author from Survey data this was done from 21 to 25 July 2011

#### ***4.4.3 Increasing Environmental Sustainability***

Narayanan (2005) summarized that modern farming has been produced not only suffice food but also it produced for surplus. Recently, it has been feeling emerging that modern farming is not safe for environment, for human health, for sanitation because of several ill health effects can seen in life style. Therefore, organic farming is recognized the best alternative method to sustainable agriculture development. Although, the goat as a species is highly debated in development literature that goat is a forest destroyer, but it is not always be true. It also contributes to conserve soil fertility by using its dung as manure. The data shows in table no. 9 that the dung of goats is altogether utilized as manure in farm field to grow crops, vegetables and fruits. It explicitly

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A Position paper (2009) Based on the deliberation held in the Symposium on 'Nutrition Security for India—Issues and Way Forward' on August 3–4, 2009 and subsequent discussion with experts

shows that 75% respondents are being used at their own farm which replaces chemical fertilizer and remaining one fourth respondents sell this dung because either they do not have their own farm or in stress condition they sell to other rich farmers. Most importantly, rich farmer also utilized as manure in their crop production.

The data of focus group interview also narrated that 'goat is a unique animal species which can eat everything particularly weeds, other plant species'. The literature also validates this data that the goat converts the weeds and not useful plant species in to meat and milk which is considered as low fat milk.

**Table 10 Use of dung or manure of goats**

Particulars	Number of respondents	Proportion (%)
We use dung at own farm as a manure	36	75
We sell dung to other farmers	12	25

Source: Elaborated by author from Survey data this was done from 21 to 25 July 2011

In Summary, This chapters attempted to explore field findings with analyzing theoretical and practical perspective in order to understanding about determining factors of adoption and rejection of technology and outcomes of goat farming as diversified and intensify livelihood strategy for poor households. Within this frame, it, further analyzed the role of local government institution in view of public livestock development policy.

## Chapter 5

### 5.1 Emerging Trend in Goat Development Sector

Broiler goat is new emerging approach in the world as shrinking pasture lands, demand high value meat products, to meet the goal of food security. Today, food security is a prime challenge to feed the world owing to reduce agriculture growth rate and rapid growth of human population. After agriculture, the livestock remains as an alternative source of feed to world in general; goat rising is also an important source of food security. 'Goats are primarily reared by small farmers but largely support to the economy and food supply to poor people. Often goats are incriminated as an enemy to the environment for its feeding habits. Generally they are allowed to graze in pasturelands where they graze and nibble on shrubs. As a result the crops are also destroyed. To tethered animals the tree leaves are the main stay of the ration. The bottom line is goat is tense to the environment and crops. The only recourse to free goats from the above clench is to develop an alternate feeding regimen, which could eliminate the grazing, and feeding on vegetation' (Kunju 2008 : 1).

What are broiler goats as a concept? 'As far as broiler goat rearing is concerned, we don't have any specific breed for this purpose. The kids produced from goats (whatever breed available in your area) can be used for broiler goat rearing (both male as well as female kids) (Shanmughvel, n.d.)'. In this approach, main notion is increase body weight of goat kids and at early young age through inducing specific feeding system at six month age sale it out in market for meat purpose which is fairly complex in nature.

This study argue that the goat broiler approach does not much beneficial for very small goat flock sized peasants) that is 1-5 goats' However, this approach will be useful for medium sized goat flocks 16-30 goats as such type of peasants can manage the housing, feeding system. Unless, the support from government would not ensure in terms of acknowledgement of the approach and providing technologies, credit and skill upgrading of goat peasants for promoting the approach in the real world.

This chapter will be analyzed in two perspective one is rich farmer as a large entrepreneur and second, in perspective of small scale farmer, women who engaged in this activity since long time. The source of data is used primary and secondary.

### 5.2 Pioneer goat entrepreneur perspective

#### **Brief introduction of Interviewee:**

Vijay Narayan (name has changed) is an International business man and lives in Ajmer city. Currently, He holds an agent ship for South Asia region of a big American Company which sale and supply machinery and tools to dealers of telecommunication service provider. Goat rearing is a new business for Vi-

jay Narayan, who is going to invest around Rs. 70 Core ( Rs. 7 million) in ten year down the line on establishing large goat farm in Ajmer.

### **Why is only goat rearing business?**

I asked him that, on the one hand, in rural area new generation is not willing to adopt goat farming as a livelihood activity. On the other hand you are going to investing huge amount in goat farming why are you investing? He replied me that 'my aim of investment of huge amount in goat farming is to provide a business entity for my one son'. He further elaborated that initially I want to earn profit only Rs. 500 per buck on sale. If I get this amount, I will invest Rs. 7 million.

This goat farm was being under construction which located very prime location, it means very close to Ajmer city and on the national highway no. 8.

### **Introducing new approach:**

He will work on broiler goat like chicken broiler. In this broiler goat concept, he narrated that 'I will buy buck at early age from farmer, age of buck could be 5-6 months. I will rear in intensive stall feeding system'. When I asked how will you feed them? He narrated that 'I will buy raw material through commodity exchange market at cheap rate, and will manufacture at my own way on my goat farm'. He more cleared that 'I have already taken consultancy from various experts, consultants on food industries; they suggested me that I should use a certain specification in feed, particularly some weight gain vitamins and amino acids. Thus, I will introduce this concept with small size of flock which will be around 3000 bucks. It depends on how much I will earn, I will increase bucks up to 10000 bucks a year'.

### **Analysis and discussion:**

Undoubtedly, this goat rearing activity is going in hand of big entrepreneur or rich farmer from poor goat farmers. It could be certainly said that the goat rearing activity has a tremendous potentiality to secure livelihoods not only for large farmers but also for poor farmer. For poor farmer it is quite necessary to that they have to adopt new technology, new concept like goat broiler approach. The broiler goat is quite common in many states of India namely Kerala, Gujarat, Maharashtra. 'Broiler goat production is highly suitable technology in areas where green fodder is not available or due to lack of grazing land. As far as Broiler goat rearing is concerned, we don't have any specific breed for this purpose. The kids produced from goats (whatever breed available in your area) can be used for broiler goat rearing (both male as well as female kids)' (ibid). The research on broiler goat rearing shows that the kids has to rear up to 90-120 days separately from their mother in specific designed houses and give specific food content and be continue milk of kid's mother. The weight would be increase 30-40 kg in short duration and after that owner of goats can sell around Rs.6000 per buck. This approach was developed by scientists for poor and small holder farmer who live in rural area, but now this approach is being adopting by big businessman or rich entrepreneurs. Thus, the study could analyse that there is a little chances to be exploited poor farmers by big entrepreneur if this approach only adopted by rich entrepreneur.

### 5.3 Small scale women farmer's perspective

Perspective of small scale farmer on broiler goat approach is not clear yet particularly in rural Rajasthan where this study has conducted. However, In Kerala, the approach has been practiced by Self help group's women with the support from local Krishi Vigyan Kendra (Farm Science Centre). The technology has been provided by KVK 's experts . Self help group members have been adopting this technology. 'A farm woman can manage about 10-20 kids at a time without any extra labor. It is highly profitable to the farmer who is already involved in goat rearing. The kids should be sold off at about 3-4 months or at the attainment of 25-30 kg whichever is earlier. A farm woman/farmer can produce more number of broiler kids in short period of time. Apart from these the reproductive efficiency of female goats can also be highly exploited by proper planning of breeding (Shanmughavel, n.d). This new concept has a pre-condition that local government accepts it and gives a room in policy and planning document. Therefore, it is an urgent need to do further research on feasibility, economic viability of this approach in local context.

To conclude this chapter, the aim of this chapter is to explore emerging thoughts on broiler goat approach in goat development sector. The study attempted to examine new changing scenario in private sector domain with field data. It also viewed women who are being involved with this approach. This view needs further study in detail on impact of their life. Next chapter will be conclusion of the study.

## Chapter 6

### Conclusion

This research was designed to understand the reasons and responses of goat peasants on intensification of goat farming at household level in semi-arid region. The study assumed that goat farming is a diversify activity in semi-arid area at poor household. Ellis (2004) proved that diversification consist on-farm, non-farm and other natural access diversity which helps to reduce poverty reduction. IFAD (2011) admitted the poverty enters into household as result of shocks like ill health, poor crop production, social expenses or conflict and disaster. In this view, the aim of this paper is to examine key determinants which influence the decision of adoption and reject the technology adoption in order to intensify the goat farming for livelihood. This paper applied innovation diffusion theory and classical sustainable livelihood framework to analyse the empirical data. Using theoretical and analytical framework, empirical data analyzed mainly in three key themes in line of research purpose and questions: Key determining factors to take decision which technology adopt and which reject , examine roles of government veterinary institutes and outcomes of intensify goat farming.

Since increasing demand of high value livestock products and occurring un predictable natural disasters like drought in semi-arid area forced to intensify the source of livelihood activity particularly goat farming intensification. In empirical analysis, key determinants play vital role to take up intensify goat farming as livelihood strategy. The main finding of this study is the process of intensification of goat farming is complex and varied from household to household in same context. Since current pattern of package of adoption of technology reveals that it is satisfactory in this neo-liberal era. The majority of farmers (42 percentages) have chosen adoption of one to two technologies, 14% goat peasants adopts three key products, 27% goat peasants adopt fully technology package. However, "There are 17% goat peasants who have not adopted any one technology yet.

The key factors which analyzed in this research are socio-economic characters, household's resources, personal variables and rate of technology adoption. Field finding regarding age of household slightly contrasts to Roger's innovation diffusion theory , as Roger's theory generalize that young people adopt technology more than older people , but this study's finding demonstrate that package of technology has been adopted by older people than younger people while young peasants are abandoning this activity, although they are seeking for employment. The evidence of data shows that social upper category (other back word cast), slightly more education of head of household , have more land ownership , large goat herd size , available more labour at household are promoting factors to adopt the package of technology. In contrary, lower strata of society, illiteracy, no land or low land ownership, small goat flock size, are key factors which hinder to process the adoption of package of technology.

Secondly, the empirical data surprised that the current rate of Bio-chemical and mechanical technology adoption among goat herder is quite impressive. Purchased feed has been adopted by around 70% goat peasants; vaccine ranked second that is 66%, third ranked is de-wormer to kill internal parasites (56%) and least percentages is 23% to uptake of bardizo castrator. The study observed that the reasons for such impressive results are increasing demand of goat meat in market and community livestock health worker enable to adopt individual technologies. The other crucial reason is that many people rear bucks for fattening to supply in kurbani market and general meat market to fulfil the demand of goat meat.

Thirdly, the survey results of this study are notable. The difference in improving additional income of technology adopters and non-adopters is quite significant. The majority of technology adopters (41% adopters) earn income range of Rs. 21-50 thousand (\$466-1111) a year, whereas around third fourth of non-technology adopter get income range Rs. 5-10 thousand (\$111-122) a year. The study observed that technology adopters are willing to invest into technology and make good linkages with market. While non-technology adopters are reluctant to invest in goat farming owing to they are under poverty vicious cycle which do not allow to uptake technology, although they want to be adopt technology. In addition, adoption of technology has improved nutrition security of household in positive way. The study found out that majority of technology adopter and non-adopters, the goat milk used as a domestic consumption which leads to nutritional security. It is very crucial for poor household who cannot afford and access milk from market. The goat farming is also significantly contribute to improve the soil fertility since majority of goat peasants, no matter they adopt the technology, they used dung of goats at their own farm which also provide synergy effect in crop and goat production system.

Nonetheless, Public intuitional enabling environment and good governance is fairly failed at grass root level. The findings of study disclose that public investment on research and development on goat development program is insufficient in terms of basic infrastructure, for instance, a refrigerator to keep vaccine for storage in reality it is not there. Inadequate ratio of deployed trained veterinarian staff and animal is iniquitous as a result the efforts of trained staff could not impact of poor's live. The study also got evidence that implementation of veterinarian scheme and program is poor at local level. Local veterinarians do not play their role effectively and efficiently in implementation of services related livestock development. The study have experienced that there is a conflict between street veterinarian and manger, other studies also validate this data. Reasons could be ideological and power structure. It needs further deeply study to know about enabling environment and poor governance how can enhance in rural setting.

On the whole, the perception like goat is a poor's cow has gradually changed; as it is emerging with new approach that is broiler goat. The broiler goat is an innovative approach which has attempted to start as business by a pioneer entrepreneur and collective way through self help group. This approach consist mainly goat kids developed in way the weight increased of kids

very fast rate on the concept of fast food conversion ratio through highly nutritive food and then collective sell in market at high price. This study explored field data evidences in which one pioneer entrepreneur has already set out this approach in real world. Second, Poor women of Self Help Group in Kerala also has got experience on this approach. But, at this stage, it is very difficult to conclude its impact. Thus, the approach required pay attention to do impact study.

It is appropriate to conclude this paper in the spirit with it began. Goat farming as a diversify on-farm activity which can intensify with the Endeavour of goat peasants and enabling environment in terms of enhancing investment and good governance at local level. Overall, goat rearing is growing and potential activity in semi-arid region, but it entails to adopt multi-facet approach to reduce poverty thorough goat intensification.



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# Appendices

## Appendix 1 Profile of Study Village

Rajasthan is one of the largest state of India in terms of area, the total geographical area is 342,239 square kilometer which is 10.4 5% of country's geographical area. The population of the state is 68.6million and decadal growth is 21.44% (Population Census of India 2001). The state has a forest cover of 16,367 square kilometer which is only 2.37% of India (India 's forest cover area is 675538).

The study carried out in district of Nagour of Rajasthan province. The Banwal village is one of the 1607 revenue estates (village) the district which located at border of two districts namely Ajmer and Nagour, but in other way, it is very close to District head quarter Ajmer, the distance is 22 kilometer from Banwal to Ajmer. In contrary, its own district headquarter is far from Banwal around 114 kilometer. It is 120 kilometer far from Jaipur. In fact , Jaipur is a capital of Rajasthan state.

The sample village of study is not unlikely other villages of Nagour district in terms of climate and rainfall “ the district has a hot summer. Sand storms are common in summer. The climate of this district in general is conspicuous by extremely dryness, large variations of temperature and highly variable rainfall. The maximum temperature recorded in district is 47 degree centigrade with 0 degree the lowest recorded temperature. The average temperature of the district is 23.5 deg. centigrade. Rainy season is of short duration during from July to mid September. The average rainfall in the district is 36.16 cm and 51.5 % humidity’ ( About Nagour District, n.d)’ As per Household Survey report 2011, total population of this village is 2772, in fact, total male are 1462 and remaining 1320 are females. The village has two upper primary schools, one is for boys and another is for girls. Two Anganwadi centre (pre-schooling centre) which work to enroll pre-school children and lactating mothers and provide nutritive supplement feed which comes under Child and women development department. To get health services, one Ayurved hospital, only two staff work, one is Ayurved medical officer and one is office assistant. But, villagers were seems not satisfied with this hospital services, because people believe that Ayurved medicine give relief very slow, and we want to get relief quickly. One veterinarian sub-centre is looking after or serving to eight villages’ animal, including small and large ruminants.

(Source: Profile is based on personal information which collected during data collection process)

## Appendix 2 Questionnaire for Survey

**Purpose of the questionnaire:** the purpose of this questionnaire is to find out who are adopting technology, and who are not adopting technology in particular population size.

**Instructions:**

- The identity of respondent never will disclose.
- This questionnaire is part of MA research paper.
- The researcher of this Paper study in International Institute of Social Studies, The Hague , Netherlands.

Name of Village                      Block:                      District:                      State:

Name of goat farmer:

**Q.1 what is your age?**

- A).20 to 30 year
- B). 31-40 years
- C). 41-50 years
- D) More than 50 years

**Q.2. what is your gender?**

- A).Male
- B) Female

**Q.3. what is your social category?**

- A). Schedule cast
- B). Schedule tribe
- C). other backward cast
- C) General

**Q.4.What is your education level?**

- A). Illiterate
- B). Literate (5<sup>th</sup> standard pass)
- C). Standard 8th pass
- D). Standard 10<sup>th</sup> pass
- D). Graduation or more than graduation

**Q 5.What land holding size do you have?**

- A). No land
- B) 0.5 to 1.0 Ha (2-4.0 bigha)
- C) 1.0-1.5 Ha (5-6.5 bigha)
- D) 1.5-2.5 ha (6.5 -10.5 bigha)
- E). More than 2.5 ha (above 10.5 bigha)

**Q.6. what is goat flock size? If yes**

- A). 1-5 goats

- B). 6-10 goats
- C).11-30 goats
- D). 31-50 goats
- E) More than 50 goats

**Q.7.Why do you do goat farming?**

- A). because of way of life (traditional)
- B). because of more than 70% source of livelihood is goat rearing
- C). because of 50-69% source of livelihood
- D). because of social status

**Q.8. did you adopt technology? If yes, please tick**

- A). any vaccine
- B). Any De-wormer
- C). Dairy Cattle Feed
- D) Use of Bardizo Castrator

**Q.9 how much do you earn a year from goat farming?**

- A). Rs. 5000-10,000
- B) Rs. 11000-20000
- C). Rs.21000-50000
- D).Rs. 51000-100000

**Q.10. what is your perception about goat technologies?**

- A). about complexity
- B). about compatibility
- C). about economic advantages

**Q.11. what is your aspiration for your kids?**

- A). kids will do study and join government job
- B).kids will do carry goat farming
- C).Kid will do agricultural work in same village

**Q.12. where do you sell your bucks?**

- A). in village- to local trader (khatik, kasai)
- B). Local city goat market
- C).Metro city goat market (Mumbai, Delhi)

**Q.13. Do you sale milk, where do you sale?**

- A). No, I don't sale milk, use it domestic consumption
- B). Yes, I sale at dairy cooperatives
- C) yes, I sale to milk vendors

**Q.14. What do you do dung of goats?**

- A). I sale it
- B). I use it at my own farm

Thank you very much

Name and signature of Surver

### **Appendices 3 Guide line for Focus group Interview:**

Date of conducting interview:

Place:

Guiding question for moderator or researcher:

1. What are the key determinants to adopt technology?
2. What are the promoting and hindering factors?
3. How these factors affect sustainable livelihoods for poor goat farmer?
4. How does local veterinarian sub- centre deliver services?