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Developing small goat holders to face food security, poverty and environmental challenges

Lessons from a comparative analysis in different regions of the world (governance, markets, production systems) for experiencing successful projects

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Abstract – Farming and agro - food systems have to face urgent social and environmental issues linked between them. The Millennium Development Goals firmned by the International Community have formalized these priorities. Poverty reduction and food safety are considered as a major challenge for at least 800 million people who are suffering hunger and extreme poverty particularly in rural areas. The development of livestock for small holders is often seen as a solution to reduce poverty

To explore and document the operational articulation between poverty reduction and preservation of environment and utilization of renewable resources in livestock production systems the results of a comparative study undertaken at the request of an International Organization are analyzed. This study was focused on development projects involving goats and compared worldwide significant cases (in Argentine Patagonia, Kenya Meru, South Western Morocco, “Comarca Lagunera” Mexico, Nepal, North Eastern Brazil, Rajasthan, Senegal, Tajikistan, Lara and Falcon State Venezuela). For each case, a SWOT¹ analysis, a cost benefits study and a goat value chain approach have been undertaken and discussed during several meetings with actors involved in these projects. The study has provided operational references and tools and indicators have been built to support implementing and monitoring such projects in the future. It highlights that developing goats by small holders can be a viable and profitable activity in so far as consultations and appropriate diagnosis have been undertaken to prepare the projects. It confirms that small holders with low inputs goat production systems may have a good real productivity and a high Internal Rate on Return (IRR) of the investments. It helped to show the different stake holders including those involved in political decisions that traditional low input goat activities, led by small farmers can help to keep rural life active and support other activities.

These results call for a paradigm shift in the mental models of development to promote human resources and capacities rather than sophisticated external solutions often based on the use of non renewable resources. Goats can often answer such MDG's as poverty reduction, gender equity, preservation of non renewable resources if their production systems are based on the valorization of local resources with low external inputs (by-products, local forage, rangelands, local breeds). Thanks to appropriate business planning and governance, innovation implemented for these activities could be a good lever for ecological intensification, food safety and resilience in many rural areas by improving the potentialities of each region.

1. Introduction, context and objectives

The general inequity and un sustainability of the agri-food systems all over the world have appeared as a major issue for the next decade. 800 million people are suffering hunger and extreme poverty, and more than half of them are small farmers. A major part of our ecosystem resources (water, soils, forests, bio-diversity) has been highly degraded by the current agro-food systems (MEA, 2005). And the important social crisis due to low incomes, rural emigration, the loss of rural employments, indebtedness, is concomitant to the environmental crisis. Within this context, the International Community and institutions have firmned an agreement to define a common strategy for challenges that humankind has to face. These Millennium Development Goals (MDGs) have linked several social and environmental issues: poverty reduction and food safety, gender equity and women' promotion; preservation of environment and water resources, adaptation to climate changing. They have been the

¹ Strong, Weakness, Opportunities, Threats

base of several programs and initiatives and many of these development projects have focused particularly on poverty reduction. They are supported by a large number of NGO's or foundations in several specific goals (training, water supply, micro- credit, women empowerment,) and sectors (agriculture, animal production, craft, local commerce) (MDG, 2010).

Livestock for small holders is often seen as a solution to reduce poverty for the following reasons listed by Otte and al., (2013):

- Livestock would be a factor of diversification of the household activities;
- Livestock could improve rather easily their incomes due to the growing demand for animal products;
- Livestock could use resources which cannot be used by other activities (rangelands, natural pastures, by-products);
- Livestock would develop employment of women and promote gender equity;
- Development of livestock would provide animal protein to poor population who are generally in deficits (possible effects on child mortality, another MDG).

The dominant paradigm is still the classical paradigm of progress and intensification. For instance, many projects have proposed higher investments that could frequently weaken the breeders. Otherwise, the development policies have been often too much external markets oriented, not clearly oriented on poverty reduction or without articulation with the environmental MDGs (Otte and al., 2013). The fight against poverty has been a source of specific investigations and several authors have worked on poor economics as Sach, (2005), Collier and al. (2009), Alberjee and Duflo,(2012) who have shown that poor people have a coherent behavior in term of objectives and risk taking.

The external negative effects of livestock, as an important cause of emission of CO2 and environmental damages have been enhanced by many publications as Jutzi and al., 2001; so the future of livestock sectors, as the other agri-food systems has to be questioned to decrease these negative externalities and develop more sustainable systems.

Among the several types of livestock, only some species would be adapted for small holders, for instance, farmyard poultry and pigs and small ruminants. So it is well known that goats are considered as "the animal of the poor" or by comparison with cattle seen as the "cow of the poor". The general opinion is that goats would be adapted for poor holders and marginalized areas because few investment is needed and they could be managed by women and at a family level to produce all commodities according to the local situation (meat, milk, fibers, etc..) even when forage are scarce thanks to their adaptation to reach any resource. For the last decades, many projects have been implemented in all continents. One consequence is that although goats are still a minority part of the livestock they have been the most growing livestock for more than 20 years (FAO stat, 2013). But in the past and until recently, (Dubeuf, et al., (2004), many of these projects have been failures and project leaders had few references to prepare them and to identify the conditions to be successful. A comparative study of several development projects involving goats has been undertaken at the request of an International Organization to identify their success factors. It was observed that most of these projects have focused on some MDGs (for instance poverty reduction) with no integration between these social and environmental issues.

The objective of the present communication, based on this study, is to explore these articulations and focusing on the level of inputs and the use of renewable resources.

2. Methodology

Several regional situations where projects involving goats have been undertaken were studied and compared (IFAD-IGA, in press). These projects are located as follows according to the main commodities.

Meat and fiber: Argentina - Neuquen Province

Meat: India - Rajasthan (imGoats² project and Heifer Project International (HPI) projects); Nepal - HPI projects in Nepal (goat value chain in Nepal); Morocco - "Promotion and valorization of the goat meat in the Argane tree area" project.

Milk and meat: Brazil- North Eastern projects (with EMBRAPA³ and EMEPA⁴).

Milk and dairy products: Kenya - FARM Africa projects in Meru Central and Southern Districts; Mexico - goat milk project in Comarca Lagunera; Venezuela - Lara and Falcon states goat milk cheeses projects; Senegal - Spanish Gan⁵ Africa and Tragsa⁶ Northwestern goat milk project.

Fiber and dairy products: Tajikistan - Fiber Sughd, Gorno-Badakhshan, Khatlon FAO and ICARDA projects

A knowledge harvesting type process (Knowledge Harvesting®, 2011) was implemented for each case. It included bibliography, and interviews to identify the main characteristics of each project and scale up their success factors.

For each case, the initial situation was described including a SWOT⁷ analysis and a description of the actors' system. They were completed by a livelihood approach and a value chain analysis. Each case was reported separately using the same framework to compare them. Two open discussions were organized to formalize the comparisons with delegates from most of the studied cases.

3. Results and discussion

3.1 Identification of the main success factors to scale up goat projects for poverty reduction

The analysis developed for the study by Dubeuf and al. (2014) confirmed that goat production systems are generally multipurpose systems with still few connections to the organized markets. Goat activities have been largely excluded until now from organized markets and have not followed the same ways of development and specialization than the other animal productions (like cattle, poultry, pig, etc...). To face new development issues, this reality could be an advantage. The main characteristics of the studied cases have been sum up in table 1 and 2.

The image of goat activities is still depreciated by many stake holders. Although the situation is slightly changing, goat activities are still largely not seen as socially and economically valorizing the related populations. In other words, there is still a threat that goat projects would keep people in their lower social situation due to this image. For the breeders themselves, goats could be seen as a transitory activity before a more attractive reconversion. Even in the successful studied cases, people met think that goat keepers would choose another activity if they would have the choice and would prefer to train their children on other activities. Other consequences of these representations are that public authorities are generally still reluctant to invest on goats and small livestock and particularly on extension services. But, very often, the demand on small ruminants products is growing and the public authorities begin to be aware of these market opportunities as it is the case in India for meat or in Turkey for sheep and goat cheese. The role of goats to support poor people would need to avoid any simplification or pre-defined idea but general assessments have been specified and confirmed by previous bibliographical references:

- Goats are well adapted to arid areas

² Small ruminant value chains as platforms for reducing poverty and increasing food security in dryland areas of India and Mozambique (

³ Empresa Brasileira de Pesquisa Agropecuária

⁴ Empresa Estadual de Pesquisa Agropecuária Paraíba

⁵ Cooperation between Gran Canaria (Spain) and Africa

⁶ Grupo Tragsa is constituted by the parent company Tragsa, Empresa de Transformación Agraria, S.A.

⁷ Strong, Weakness, Opportunities, Threats

- The investments to develop goat production are lower than for cattle but social, economical local conditions are not always filled to develop it and make it a way to fight poverty
- The market conditions are important factors to decide if it is possible or not to implement goat projects but an open minded approach of the market is necessary including auto-consumption, social governmental distribution, (Dubeuf, 2004)
- The objectives of each project have to be defined according to the initial situation (in terms of education, infrastructure,...), invested funding and expected returns but it takes time to get significant and sustainable results and projects are often too short and 3 years are generally not enough, (Dufumier, 1997)
- The presence of public services in the area is an important success factor but informal economy and local organization have a role to play
- Developing technical improvement is important but not always the solution to solve the problems that could be linked more to political, administrative, cultural or economical aspects (Hall et al.2004)
- Projects can focus simultaneously on several objectives but each sub - objective (gender conditions, market structuring and productivity) of each project must be clearly defined with clear quantitative and qualitative indicators what is not always the case.

Five key internal or external factors have been identified and developed:

- Key factor 1: "To develop goat production, it is necessary that smallholder producers are interested and keen or allowed to participate at all stage of project design". It was enhanced that there is no general model to be applied everywhere, what is not an original comment but has to be reminded; in many cases US \$2 /day to go out poverty could be an easy to reach output if a project is correctly managed and people really interested.
- Key factor 2. "Intensified systems based on high inputs are not recommended for pro-poor projects". There is a convergence between knowledge harvesting and the opinion of experts on the fact the projects must not increase the dependence of goat keepers on external outputs.
- Key factors 3. "There are several imperative key factors: (i) minimum identified goat keeping initial activities, (ii) minimum public general infrastructures, (iii) A form of political will is identified, minimum Research and Development institutions and local existing organization (NGOs)".The main consequences of these key factors are when minimum infrastructures are not present, the projects have to focus on these infrastructures including capacities and training.
- Key factor 4. "The design of a pro-poor development project must consider targeted and measurable social and economical returns". Very often, projects have not identified objectives and identified returns
- Key factor 5 - Developing a simulation model would favor monitoring of the results all along each project

The exchanges have confirmed that the studied cases were good samples of the diversity of involving goat projects and of their issues. They have given clear elements to go forward and scale up the future projects. The study has proposed several outputs to support the preparation and monitoring of future projects:

Output 1 – Project and investments typology

A project typology will be proposed. It will consider the geographical and human level of the project (community and village levels, regional or national ones), their main issues (technical improvement for food security and auto sufficiency, developing regional capacities to secure production, organizing a regional or national value chain, ...) and the investments related to these issues and commodities.

Output 2 – To develop goat value chain tool analysis

Access to market has been confirmed as a major factor for the contribution of goats in the fight against poverty. Although goat activities are nearly always multipurpose, value chain analysis must generally consider each commodity separately.

The identified positive experiences described through the several cases have given elements on how to facilitate small-scale farmers to access the markets. To do it, a value chain analysis is needed and could be a first stage by mapping the actors: Identifying the number of actors and volumes of products; mapping the core processes and flow of product.

Output 3 – Cost-benefit analysis

Compiling data on the studied productions systems has given references on the minimum acceptable ratio cost–benefits to build a goat oriented pro-poor project. The Table 3 has summarized the ROV of each project.

Output 4 – Drawing the framework of a future simulation model to monitor the governance of the projects

3.2 The characteristics of the projects and identified success factors have shown that small holders could help to improve food security with limited negative environmental effects

The first advances of this study have been to give clear and comparative technical and economical results for very diverse goat production systems for small holders. Until now these data were very scarce. It has confirmed that in favorable conditions and few investments, goat projects could be profitable for poor households and make them going out of poverty with possible significant impacts not only for communities but also at regional levels. The comparative study has shown that the economical coherence and viability of the small goat and small livestock holders are based of low inputs productions systems based on the utilization of renewable resources (forages, local breeds, local know-how and practices). The systems for small goat keepers are sustainable and will be resilient for the local communities if they are based on the intensification of local family employment. Thanks to these strategies, and for any commodity, undertaking such projects could improve the socio–cultural capacities of the systems to be re–naturalized. Since several years we have observed a movement of redefinition and diversification of agricultural systems toward an agricultural and environmental transition (Buttel, 1995 and Allaire, 2002). Our results suggest that these transitions would be more favored by agro-ecological solutions than by bio technological progresses based on artificial solutions. As already proposed by Agri-monde (INRA –CIRAD, 2009), we have confirmed that this agro-ecological perspective could be applied to the livestock sector: With a low productivity improvement but applied to a large number of farmers, poverty could be significantly reduced and food safety improved with no environmental impacts. Agro–ecology has been defined for 30 years (Altieri, 1983) as the application of ecology in Agriculture not only at the farm level but also at the farming system one. Our results have also demonstrated that the agro–ecological problems cannot be considered on a technical and economical point of view but have also on the socio–technical side (multiplicity of issues, of actors, of problems). The importance of the projects governance, political will and monitoring of the projects has also been underlined. With an interdisciplinary approach, agro–ecology and ecological intensification applied for livestock could be an answer to the identified issues. Agro ecology can be seen as a mode of agricultural development that has results for fast progress for many vulnerable groups (De Schutter, 2010) and could be applied for goats. The development of small livestock could be an orientation and a strategy to develop transitions towards agro ecology and ecological intensification.

Conclusion

This analysis has demonstrated that there is a strong convergence between poverty reduction and environmental issues. As the agricultural policies are very rarely intentionally against poverty and have been often very fragmented. Our results could be an argument in favor of enhancing pro-poor projects and particularly those involving goats and changing paradigms to promote human resources and capacities rather than the use of non renewable resources. The returns on investments, although not very spectacular, are real and significant; they are even high comparatively to more technological agricultural projects. By focusing on value chains, project governance, developing capacities and local production systems and local genetic resources, this communication has confirmed the advantages to re–invest in agriculture to face the current development social and environmental issues.

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Main commodities localization	Project impact and objectives	Strong points	Weak points	Opportunity	Threats	Main investments Comment
Meat						
<i>India - Rajasthan</i>	Community level for auto sufficiency and productivity Regional level for services capacities and market organization	Existing breeds A favorable context	Very small herds size Low educational level Lack of forage, water and foders Few negotiation capacity Few veterinarian products and services	Expanding demand A high experience of local NGO and ILRI Coherence of the project with the national policy	Lack of clear project objectives Lack of coordination between the community and state levels	Training on nutrition, breeding hygiene and negotiating (weighing scale) Market platforms Duration of the project (too short)
<i>Nepal</i>	Community level for auto sufficiency and productivity National level for market organization and value chain	Fodder available from Technology available to ease production	No organized market Bargaining ; lack of organization Low productivity No services Small herds Few roads and infrastructures bad image	High demand for goat meat Private emerging and frozen meat sector No opportunistic investments on goats High interest for goats and many projects	Lack of collective organization and policy Emigration	Training in forage production , management and hygiene Distribution of local improved goats Market platforms
<i>Morocco - Argane tree area</i>	Regional level for market development	Goat production A specific form Fodder and resources	Competition with oil production Bad image No services	Changes in urban demands for goats Policy in favor of local products	Degradation of the argane tree area Opposition of the oil industry Climate changing and droughts Impact of migrant herds	Slaughterhouses Frozen trucks Certification and Organization of Associations
Meat and fiber						
<i>Argentina - Neuquen Province</i>	Local district for market development and forage management	High city in goats A long time tradition	Lack of land for grazing Poor organization	Goat law policy Tourist development Increasing demand for goat meat	Range land degradation Other jobs available	Slaughterhouses and fridges Certification and organization of goat breeders associations

Table 1: Main characteristics of the studied cases for meat commodities (from Dubeuf and al., 2014)

Main commodities localization	Project impact and objectives	Strong points	Weak points	Opportunity	Threats	Main investments Comment
Milk and meat						
<i>Brazil- N. E projects</i>	Regional and state level for value chain and productivity	A working half extensive model Irrigated areas Political decision to buy goat milk for social programs Few alternatives to goats in many areas	Low education level Lack of coordination between the several services Lack of confidence of breeders for governmental programs	Improving situation of the Country A national policy to eradicate poverty A R&D well developed network Expanding market for goat milk A higher demand and initiatives for goat meat	Lack of market alternatives and organization for milk surplus Bureaucratic governance of these programs Emigration in Southern areas Climate changing and drought Lack of private investments Possible competition with Southern intensive goat milk sector	Training and support of pioneer groups Dairy units, slaughter houses and parks to gather kids
Milk						
<i>Kenya – Meru projects</i>	Regional project to improve technical efficiency and productivity	Local consumption of goat milk Fodder resources potential A long time presence of NGO's and projects	Low educational level Lack of "good" dairy goats No public services No vet supplies	High and expanding local demand for goat milk	Poor performance of partners Governmental limitation to import breeding stock	Breeding stations for crossing with imported bucks Training and capacities Cooling tanks
<i>Mexico - Comarca Lagunera</i>	A Community project to improve technical efficiency	Local know how Community Interest	Lack of resources, negotiating power, genetic resources	Expanding demand for goat products and kids Added value with cheese and "dulce de leche"	Range degradation Migration Lack of public policies	Capacity building on hygiene and management Community based breeding plan
<i>Venezuela – Lara Falcon</i>	Regional Technical efficiency	Local Know how and interest for cheese and "dulce"	Lack of resources Poor organization	Successful R \$D environment Goat cheese expanding demand Government support	Lack of policy regarding : Range degradation Market based quality/health Livestock thievery Paternalism	Water reservoirs Training and trials on forage production
<i>Senegal - Spanish goat milk project</i>	Regional level to develop an innovative goat milk system and market	Local shepherds used to milk animals and drink milk Settlement of pastoral people Irrigation along the river and by products	No tradition for goat milking No references on the adaptation of exotic breeds Climate changing and drought	A small local market for goat milk around the cities for expatriates and tourists (cheeses) or local people (acid milk) A well monitored Spanish project	Competition with milk powder No national coordination between the projects Sustainability after the end of the project	Import of Canary goats and creation breeding centre RD on local forage Training Duration of the project (too short)
Fiber						
<i>Tajikistan:</i>	A Regional project (districts) to improve Market efficiency and farmers organization	High world Demand for fiber A local skill and breed	Low fiber quality No infrastructures and assistance	Existing groups Market potential	Animal Health situation Lack of long term strategy Emigration	Breeders organization for marketing Training on improving quality

Table 2 : Main characteristics of the studied cases for the milk and fiber commodities (from Dubeuf and al., in press)

Project's location Main commodities	Herd sizes	Total Investment (USD)	Number of beneficiaries / Unit	Additional Income/ /family/year USD Total Total income USD	IRR (%)
RAJASTHAN Meat +Milk	5->8	1886040	2990	125 1097008	16
NEPAL Meat	3->8	81936597	138000	208 76007640	24
MOROCCO Meat	50->55	1808251	1444	860 2983605	37
PATAGONIA (Ar) Meat + Fiber	377	982869	250	362 267147	14
BRAZIL – NE Milk+ Meat	18->28	638392	250	2452 1613168	41
KENYA- Meru Milk	4	33574	200	196 108538	54
TAJIKISTAN Fiber	10	11458	334	181 152989	48

IRR: Internal rate of return. Incomes are before labor costs

Table 3 - Main Benefits of the investments of each case (from Dino Francescutti, FAO in IFAD-IGA, in press)

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