Effects of Natural and Market Risks Management on Results of Steppe Breeding System in Algeria

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ABSTRACT

This paper aimed to evaluate impacts of risk management (RM) on sheep production. It is based on Solvsamp Modeling, to analyze empirical data (2003-2011) obtained in two marketplaces. Results proved that RM was sometimes ineffective against natural agent severity or market prices fundamental elements (supply, demand) which would have caused strongly risks within season independently of one another. With government policies producers based their RM tools on the use of concentrated animal feed input and herd size management, either this last or herd mobility (nomadic, transhumant) and animal feed diversification, but the RM strategies and returns for individual farmer looked like at a point in time. RM ensured for producers the margin profit rate of 15 percent in winter to 33 percent (summer) and conversely high seasonal coefficient (1.25) in winter, low (0.86) in summer. RM must consider the seasonal, economic or policy factors and specificity of each breeding system to be more efficient.

Keywords: Agricultural Risk, Risk Management, Agricultural Marketing, Economic Modeling, Performance Indicator.

INTRODUCTION

Stockbreeders activities are submit to market risks (price, profit and firm viability) and natural risks (climatic and health vagaries) (Dhuyvetter & Herbel, 2013; Santos & Barrett, 2011; Aimin, 2010; Barry & Fraser, 1976). All kinds of risk is a possible danger, but also some opportunity, more or less predictable which occurs during the sheep farmers main production function, linked to the market by the marketing chain and the sales force (Jaffee et al., 2010). There are several risks related to rearing and can be divided into five categories according to their nature, namely natural, economic (marketing), operational (production), social political (legal) and finance, with often a systemic nature which makes their difficult management (Antón et al., 2011; Crane et al., 2010; Jaffee et al., 2010).

Among them, we retain the first two, because they are more occurring in the area, at time of great uncertainty and vulnerable farming conditions, which allow developing the empirical basis of our analysis (Just & Pope, 2003). Seasonal climate variability is a major source of production risks which is also associated with other sources of production risks such as pest and disease incidence and with marketing risks greatly (Fraisse et al., 2010). Stockbreeders have mainly recourse to operational powerful tools which are

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concentrated animal feeding operations, herd size management and herd mobility against such risks in local breeding system (Sommarat et al., 2013; Antón et al., 2011; Huysentruyt et al., 2009). Their using levels defer very often according to sedentary characters and nomadic or transhumant migration in response to spatiotemporal variability in forages and water availability (Sommarat et al., 2013; Atchemdi, 2008) and is mainly founded on market law.

In addition, the governments create public instruments (Jaffee et al., 2010; Jones & Kwiecinski, 2010; Ackah & Appleton, 2007; Barry & Fraser, 1976). For market access standards, there are three rules which are market access, prices setting and health rules. Health rules avert and respond to epizooties (scab), herd destruction and public health problem. The markets are traditional, free, and sheep are bought at current market prices. However, government policies are two different categories (Antón et al., 2011; Jones & Kwiecinski, 2010).

First, we have the public instruments as social wellbeing or support to poor households in time of increased price by direct money transfer or the aids in kind (Antón et al., 2011; Jaffee et al., 2010). The second includes the interventions on the markets to limit the rise or the fall of the sheep prices and concentrated food prices (Antón et al., 2011; Jaffee et al., 2010). According to the situation, the public authorities react by the importation of the concentrated animal feed resource or red meat, support to them, restriction of the meat export. It is also the possibilities for the farmers, millers, traders to receive subsidized loans, in order to compensate the roughs access terms to the private sector loans.

The last is the support measures granted to the producers. The State subsidizes several surgery products, agricultural water, with a partition in insurances damage and people since 2006. And above all they employ private instrument of the risks coverage for the producers (forward contact, income or cash flow insurance, climatic index) (Sommarat et al., 2013), without "touching at the prices" in 1980 and 1990, following the neo-liberalism critique (McCreary, 2012; Murphy, 2012; Jones & Kwiecinski, 2010; Ackah & Appleton, 2007; Piketty & Boussard, 2002), which are not unfortunately available in the region. Contrary, the period 1930-1970 was that of the measures taken by the public authorities to support the producers and the consumers or *to limit low-price and high-price extremes related to the way of market forces under normal conditions or causes by factors which are exogenous for it* (Piketty & Boussard, 2002).

In the districts of Ain El Bell and Djelfa *(Figure 1),* agriculture occupies more than 35% of the working population, according to the Regional Development Management (DPAT) (2009). In 2009, the districts of Djelfa and Ain El Bell respectively count 2094 and 1259 stockbreeders and comprise the greatest numbers of the sheep (131000 in Djelfa and 496000 in Ain El Bell). Both of them bring together 25.08% of the production of the area estimated at 2.5 million animals and the El Idrisi commune arrives in third position with 120 000 heads (DPAT, 2009).

The Concentrated Animal Feed Input (CAFI) is defined like resource rich in mineral and organic components, introduced as a food which enters the sheep production in the area. There is no fixed concentrated animal feeding operations for livestock in mobile and sedentary systems and the use is varied according to the various sources related to climate, feed availability and the price (DPAT, 2009; Atchemdi, 2008).

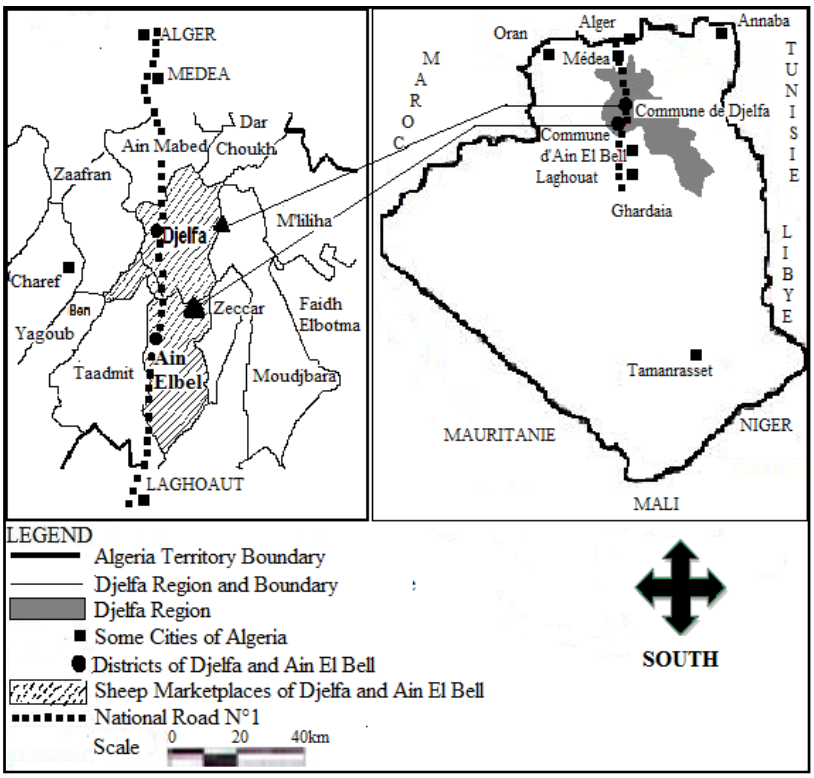

Figure 1. Study area and weekly marketplaces (Ain Roumia, Djelfa)

Source: Map adapted of those of the DPAT, 2009

As for the operational concepts employed, at first, we distinguish breeding marketing and advertising. Marketing is all the actions leading to current or future product market analyzing and to implement the tools to meet demand or, if need be, to stimulate it or arouse it (Malaval & Bénaroya, 2009; Tomek & Peterson, 2001). It constitutes with trade action the trade function or the provisioning and the distribution which are the obvious developments of the production function.

In marketing, advertising is the whole media techniques to act on trading and commercial links to inform, influence public opinion in order to promote a product or to maintain exploitation or its product image. As a communication, it's the important component and most visible in marketing and, but isn't always done by the mass medias (radio, television, Internet). This formula exceeds at the same time the possibilities and the needs of the local pastoralists. It's possible to reach target consumers by public relations, promotion and word of mouth and by sponsoring; the produce brokers and the farmers can carry out it well (Malaval & Bénaroya, 2009; Tomek & Peterson, 2001).

Then, there is the sales force which is also called sales network or sales team. It comprises all the people who have as main mission of selling the firm products, to generate the healthy turnover, by direct contacts with the local potential consumers, wholesalers or prescribers (Zeyl & Dayan, 2003). It is organized and structured around the farm manager, which provides mainly with its household members the marketing function which is priority for the farm sector.

The seasonal variation is the production and sale

produce fluctuations which repeat in such or such season, caused by the economic and natural factors. Research on seasonal climate forecasts as an agricultural risk management tool has pursued three directions: modeling potential impacts and responses, identifying opportunities and constraints, and analyzing risk communication aspects. Most of these approaches tend to frame seasonal climate forecasts as a discrete product with direct and linear effects (Crane et al., 2010).

We distinguish 4 seasonal variations (S1, S2, S3 and S4) which are respectively (winter, spring, summer and autumn), whom affect pastoralist activity and requires a lot of risk management tools (Crane et al., 2010; Westhoff, 2010). We noted with time series of individual year ranged from 2000 to 2010 that the hottest month is July, with 34 °C and coldest is January, with the average temperature of -3 °C, but it can vary from -3 to 12 °C during the day (National Meteorological Office of Djelfa (NMOD), 2011) (*Appendix 1*).

The temperature of the air is one of the elements more determining in the characterization of the vegetation, thus on its growth (conversion of the radiation into biomass) and its development (Fraisse et al., 2010; Westhoff, 2010; Amigues et al., 2006). The plants develop between very variable thermal limits; certain species tolerate low temperatures, while others are very sensitive there. Generally the plants develop when the monthly average temperature reaches or exceeds 5°C, but in temperatures known as cold, tissue and cellular damages occur and in negative temperatures, the aerial parts die (Fraisse et al., 2010; Westhoff, 2010; Amigues et al., 2006).

In the area, the average precipitation is 291mm per year *(Appendix 2).* Pluviometer is the most changed climatic parameter through the different good and bad seasons (GS and BS) by affecting the breeding system (Dhuyvetter & Herbel, 2013; NMDO, 2011). From 2000 to 2011, it observed that the GS affected 1986, 1990, 1991, 2004, 2008 and 2009 with rainfall level of 393; 447; 454; 376; 337 and 387 mm respectively for the area. While 2000 was the driest season with the value of 152 mm (NMDO, 2011). It's *linked dryness, at the same time, with a pluviometer deficit, in its general acceptance and with the climatologically criterion which is the frequency episodes with 3 consecutive months of lower precipitations than 50% of the normal* (Fraisse et al., 2010; Atchemdi, 2008; Amigues et al., 2006). The majority of crop failures in the United States of America (USA) are associated with either a lack or excess of rainfall (Fraisse et al., 2010)

These empirical basis and operational concepts proposal definitions lead us to raise the question of: Is it possible that the agricultural risk management tool reduces totally the economic disasters associated with returns inefficiency by ensuring profit for the breeders? To answer it by the phenomena explanation, let us admit temporarily that: The risk strategies were sometimes ineffective against natural agent sensitivity or market prices fundamental elements (supply and demand). By putting the risk instruments into practice, the market participants would have a great risk aversion with its disasters, but would prefer risk-taking (Dhuyvetter & Herbel, 2013; Aimin, 2010).

The study aims to know and to evaluate the effectiveness of the measures taken by the producers and the public authorities, to prevent the risk effects on the results of local steppe breeding system. The analysis presents a great interest; because of lot of analysts expect a greater prices fluctuation in the future. It's the result of the general trend to the reduction of the stocks; increasingly link more tiered between the harvests prices and energy prices, and the sudden and prolonged intra-annual variations related to the climate change (Murphy, 2012; Jones & Kwiecinski, 2010).

2. MATERIALS AND METHODS

The analysis is based on two orders of field empirical data and their instructions for use. First, documentation gathered two kinds of data: the weekly information (2003-2011) obtained by the Institute for National Agricultural Research of Algeria (INARA) in Djelfa on the two sheep production markets (*Appendix 3*) and those of the climate (2000-20110) provided by the NMOD (*Appendix 1 and 2*). Then, the survey allows us to collect the information among the pastoralists with informal activities (Sommarat et al., 2013), because less organized on an unofficial basis and devoid of elementary data (*Appendix 4*). It was carried out over six months from May to October 2011 on basis of half-open questionnaires in the two communes (*Appendix 4*).

The survey target is the main economic operators on the local sheep markets. For the preliminary survey, it was about discussion with the stockbreeders, the CAFI sellers, and the consumers to determine several problems which affect them and to know their future prospects. We also asked the opinions of the veterinary doctors and the senior managers of INARA of Djelfa and the Administration of the agricultural services which gave us useful information and a lot of advice on the economic operators on the markets, their farm activities and transactions. They gave us a general idea on the study subject and made possible the readjustment of the final survey questionnaire.

As far as sampling methodology, the sample size contains 900 survey individuals for breeders (450 operators in each market). The sample included therefore 900 individuals on the average total of 3000 active breeding farmers to supply their products each week. In field reality, the data of INARA include all categories of the sheep prices supplied in the two markets and those of all categories of the CAFI prices which are barley, common wheat and their brans. There are data in the rough.

The survey is therefore the third type of observation, which completes that of the INARA, and we want to know the producers strategies towards the sheep price instability and the feed resource costs variation according to the seasons and the risk management measures. The survey allowed determining the number and the sellers which very often put their sheep on each of the two markets. It allowed also to identify breeding system in practice (sedentary, transhumant and nomadic), the importance of government instruments for each system as well as the control of flock. It then allowed finding the most representative categories of sheep in the markets, through the seasons and the most homogenous in point of view of weigh, quality and price. Thus, we chose, for the demonstration, these following sheep categories: lambs from 6 to 9 months, empty ewes, ewes in gestation, and ewes with lambs, tegs, ewe tegs, rams. As for the CAFI, we hold the most used and their prices: barley, common wheat. Thus a *crop modeling effort was undertaken for selected commodities with the objective of providing base lines for evaluating crop production risk under alternative market and climate forecasts* (Antón et al., 2011; Fraisse et al., 2010; Barry & Fraser, 1976).

2.1. Operating principle of the Model

Many well-developed models of price behavior exist, but appropriate characterization and estimation of the probability distributions of commodity prices remain elusive (Tomek & Peterson, 2001). We used Solvsamp which is a Model Solver Microsoft Excel. It is designed for the risks related to the marketing actions which link the producers to the markets. It is a non-linear model of optimization employed to provide the solutions to the firms which must face up and useful to the political actors, scientists and farmers. However, it is important to express the reserves on the complexity of the risk

management (Just & Pope, 2003) in the two communes.

Using input depends only on the animal category; the same breeding practice is required for the whole breeding farms. The model does thus not take into account the specificity of the farms related to scale effects or the adoption of a specific production technology. There are, for example, privileging herd mobility in the nomadic and transhumant systems to the detriment of the use of CAFI in the sedentary system, while sedentary breeders move sometimes their flocks to take economic advantages of the free access distant pastures (Sommarat et al., 2013; Huysentruyt et al., 2009).

The used resource value for each sheep category is proportional to the production value. Total costs obtained are the sum of relative costs for the various animal categories (Antón et al., 2011; Fraisse et al., 2010). Absence of a production input constraint implies that consumption of a resource by a farmer does not affect the consumption of the same resource by another. Nevertheless, for realistic modeling problem, we defined limiting factors which we apply to several values (Antón et al., 2011; Fraisse et al., 2010). The seasonal sale volumes sum (variables cells) is ≥ 0, but equals the whole annual (constraints cells) implied to the targets cells (seasonal coefficient, profit) (table 1).

2.2. Financial Aggregates on Exclusive of Tax

At first, there are specific costs, which are about the factors whom the input level is directly depending on production volume (veterinary, seed, fertilizers (forage production), veterinary fees, natural forage, CAFI, wages, transport, drugs and water. Then, we have the structural costs, which are linked with the farm scale (sales force, advertising, land cost, material, sheds and outhouses maintenance). Let consider the formulas on exclusive of tax, which shows how direction principle of Solvsamp and explains Table (1).

Line	Contains	Explanation
1	SY = Sale of 4 Seasons; SS = Seasonal Sale	
2	ASS =	Avarage Seasonal Sale = $\frac{SY}{4}$
3	Fixed Values	CS = Seasonally Coefficient = $\frac{SS}{ASS} * 100$
5	Fixed Values	Unit Sale : US obtained on the markets according to season
6	$= B5 * B18$	Sales Turnover: $ST = US * P$
	=	Unit Sale [line5] multiplied by Price [line18]
7	$= B5 * B19$	Sales Cost: $SC = SC *$ Produce Cost
	=	Sale Unit [line5] multiplied by Produce Cost [line 19]
8	$= B6 - B7$	Gross Profit: $GPt = ST - SC$
	=	Groos Profit [line6] minus Sales Cost [line7]
10	Fixed Values	Sales Force: SF
11	Fixed Values	Advertising Budget: $AB = \frac{6.3}{100} * ST$
	=	6.3% multiplied by Sales Turnover [line 6]
12	$= 0.15 * B6$	Overheads: $O = 15\% * ST$
	=	0.15 multiplied by Sales Turnover [line6]
13	$= SUM[B10:B12]$	Total Costs: $TC = SF + AB + O =$ Sales Force [line10] + Advertising Budget [line11] + Overheads [line12]
15	$= B8 - B13$	Profit: $Pt =$ Gross Profit [line8] less Total Costs [line13]
16	$= \frac{B15}{B6} * 100$	Profit rate: $PtR = \frac{GPt}{ST} * 100$
	=	Profit [line15] divide by Sales Turnover [line6] multiplied by 100
18	Fixed Values	Produce Price: P = avarage price of retained sheep categories
19	Fixed Values	Produce Cost: PC = Sales Unit Cost

3. RESULTS

3.1. Breeding System and Importance of Risk Measures

Djelfa and Ain El Bell are concentration places of the stockbreeders of Djelfa (place of residence) and the sheep production markets which are characterized by the great number of the sellers which is clearly higher than that of the buyers. The transactions are generally carried out between sheep dealers and stockbreeders. But there are also sellers (65%) who are at the same time dealers and producers. There are moreover the most important and largest marketplaces of Djelfa and Ain Roumia (District of Ain El Bell), even all over the country. The markets take place every Sunday on the place of Ain Roumia and every Monday on that of Djelfa.

The usual breeding system is composed of the nomad, transhumant and of the sedentary and according to them,

sheep numbers are not the same (Table 1). In each one, a famer develops different preventive strategies based on the government measures before fighting together over the same clientele in the same sheep marketplaces. However, apart from the clientele and the markets, the field observation shows a fresh approach about complex strategies which protect stockbreeders against their marketing and occupational hazards.

Table 1. Breeding system and sheep number in the two districts

		Sheep number according to farmer		
		Small-scale farmer	Medium-scale farmer	Large-scale farmer
Breeding system		≤ 99 heads	100-299 heads	300-1400 heads
Nomad	46.64 %	26.66 %	16.66 %	3.33 %
Transhumant	26.66 %	0 %	26.66 %	3.33 %
Sedentary	26.66 %	6.66 %	16.66 %	0 %

Table 2. Model of profit rate by Solvsamp (Unity: DA: 100 DA, Dinar Algerian=1.08 euro)

	S1	S2	S3	S4	total
Seasonal coefficient[1]	1.25	0.97	0.86	0.91	
Unit sale[2]	95277	74342	65833	69722	305174*
Sales turnover	1502.10^6	1100.10^6	999.10^6	1033.10^6	4804.10^6
Sales costs	879.10^6	500.10^6	403.10^6	440.10^6	2224.10^6
Gross profit	262.10^6	600.10^6	596.10^6	592.10^6	2051.10^6
Sales force	76.10^6	55.10^6	50.10^6	52.10^6	234.10^6
Advertising budget	95.10^6	69.10^6	63.10^6	6.10^6	292.10^6
Overheads	225.10^6	165.10^6	149.10^6	155.10^6	695.10^6
Total costs	395.10^6	289.10^6	263.10^6	272.10^6	1221.10^6
Profit[1]	226.10^6	31.10^6	333.10^6	320.10^6	1189.10^6
Profit rate	15 %	28 %	33 %	31 %	25 %
Produce price	15759.9	14807.9	15176.7	14809.1	15138.4
Produce cost	9234.3	6732.1	6118.1	6317.0	7025.2

Legend:

[Targets cells] [1]: Seasonal Coefficient, Profit

[Variables cells] [2]: Seasonal Sale Volumes ≥ 0

[Constraints cells]*: Whole Annual Sale (global unit sale per year)

3.2. Breeding practices for risk management

3.2.1. Spatial migration and pasture access

Nomad bases his behavior on permanent mobility giving to him economic advantage to avoid often areas where the demand for animal feed input exceeds regularly the supply with limited use of CAFI. Transhumant migration based mainly his risk strategies on periodically moving with his herd into the same ecological area and a reduced utilization of the CAFI. Sedentary farmer is the one which uses mostly the CAFI and his operating range with his flock is limited. But the most interesting is that the CAFI operations are increasingly important whatever the season and it's now in general use in the three breeding systems in the region according to 93.33% of the respondents.

In the studied zone, 53.33% of the survey sample (sedentary) has farm land and only 6.66% of the studied pastoralists use irrigated green forage. 70% of the stockbreeders affirm that there's charge according to space and season to graze the herd for the majority of the pasture, and 30% of them see that the access is deregulated and free. In fact, the deregulated and grass is belonged to the public domains; the majority of them are in the western area of the Algerian steppe, and in the pre-Saharan areas (southern limit of the steppe). They are preferred by the medium-scale farmers and large-scale farmers *(table 1)* who have the vehicles and the transport costs are compensated by the grazing exemption from payment. Among the sample, the stockbreeders who practice the pasture hiring for their sheep estimate that grazing price changes according to rainfall, with increase in BS *(table 3).* For the mobile pastoralists, the migrations bring back them 42.30% of additional excess of income over expenses compared to immobility.

3.2.2. Access to water and vaccination practice

In spite of policy of support to agricultural water, water price list vary between 100 and 200DA/200 liters (*100 DA, Dinar Algerian=1.08 euro)*, except stockbreeders who reach free water by using the water of rivers, storage dam and wells *(table 3).* In the two communes, 100% of the stockbreeders practice seasonal vaccination of their herds and obtain thus pricing policy for drugs.

Table 3. Spatial migration, pasture and water access (Percent)

Spatial migration		**Access to pasture**		**Access to water**			
Yes	73.34	Free	30	Paying and painful		56.67	
No	26.66	Not free	70	Free water (rivers, dams, wells)		43.33	
Price variation in bad season							
Farmer	10	5	10	28	15	12	20
Rise rate	100	80	60	50	40	30	20

3.2.3. Concentrated animal feeding operations

In the study field, the beginning of the use of the CAFI defers from breeder to another; 30.76% say it's in the early 1970s, for 26.92% 1980s, and for 42.30% at the beginning of 1990s. And the intrayear use of the concentrated feed input intervenes all long the seasons if it is raining or not. In GS, the producers use these resources only in feed scarcity period: end of autumn and in winter, but in summer the stubble is abundant. In BS, the farmers are obliged to use the CAFI every season, with significant quantities; in the three breeding systems, daily feed ration of CAFI rise to 45% during

the 1990s.

CAFI shortage appears in two distinct seasons (apart from religious period (10%), autumn (35%), and especially in winter (55%) where the barley, the common wheat (and their brans) are concerned. Autumn corresponds to the period of great consumption of the CAFI, it is followed by winter. All the survey producers think that if the concentrated feed resource price increases the sheep price falls gradually, on the other hand, if the CAFI price lowers the sheep price increases considerably (*Table 2*).

There is only one public company, which is the Algerian inter-professional office of the cereals (OAIC). That remains source of the least expensive CAFI and local farmers provide to sheep population only 6.67% of the total volume offered in the area. And the farmers buy the feed input widely with the informal sellers (60%) which control the market; the consequence is that the feed good is delivered to the stockbreeders expensive. This contributes to reduce the profit rate, according to season.

3.2.4. Herd Size Management

During the GS, 32.14% of the farmers buy sheep; and 67.85% of them do not buy and do not sell sheep. During the BS, 0% of the producers recapitalize, 85.74% destocked, and then 14.28% of the stockbreeders are stable whose majority of them are medium-scale and large-scale farmers who have funds to absorb the risks effects.

However, the sheep numbers are also related to the morbid damage caused by the climatic parameters. In this case, the lambs are more sensitive during the time marked by the lack of rain, which also explains the proportion of their fall in the sheep population. It was noted that the herd composition, in terms of the sex and age, remains almost the same, for all the stockbreeders, whatever the climatic risks. The lambs are the first categories touched by the seasonal disasters for the breeding system (56.69%), followed by the tegs (54.21%), but the rams are saved.

3.2.5. Marketing and Commercial Action

The sedentary and mobile stockbreeders, 100% members of informal networks, have resort to the external resource linked by a contract for the commercial function. It is a commission agent, a prescriber or a traditional intermediary and the stockbreeder pays only after the sale. It is occurred mainly on the two weekly marketplaces (86.66%) against 3.3% for selling with the cattle trader on farm and 3.33% for selling with the cattle trader and putting on the market.

3.3. Government Policy for Pastoralist

For the respondents (100%) the mobile and sedentary stockbreeders benefit by the market standards access. Traditional health practices remain sometimes to reduce the veterinary expenses which increase in S1 and S4. There is the case of scab treatment caused by the *acaridae*.

Subsidized loans are settled on markets dominated by informal activity and the economic operators who are sensible (90%) to the prohibition of the loan with interest, for religious reasons. In the third category of the measures, we can also include the elements of the second, because the producer benefit by it for his activity. In spite of the agricultural water pricing policy, the field statement and the results of steppe breeding system show the fluctuations of their costs through the S of high or low-demand which impact the profit rate. The direct money transfer come at the time of the seasonal sale (religious offering), influencing market fundamentals without link with the climatic effects, and affects 100% of the pastoralists.

4. DISCUSSION

The field results show that the preventive measures do not stop sometimes the risk effects to occur, i.e. they are not very effective. We can however mention that sometimes, the severity of the phenomenon is so bad that the risk measures are not enough to reduce the losses of the producers (Murphy, 2012; Sarthak et al., 2010; Westhoff, 2010). Or another risk study limitation, risk management impacts are not easy to be empirically distinguished if not impossible with current informal farm sector except by imposing artificial specifications on the data including the structure of intertemporal risk preferences (Just & Pope, 2003).

But the last category of government policies constitute a strong illustration of the perverse effects on the fundamental elements of the markets by modifying them (Antón et al., 2011; Aimin, 2010; Just & Pope, 2003). The second is also turned away or not in accordance with the expected result of the supporting policy, because essentially of the domination of the informal market and it's without veritable effect on produces price delivered to the clientele (CAFI, agricultural water, sheep) (Dhuyvetter & Herbel; 2013 Sommarat et al., 2013). For example, herd feed marketing becomes lucrative activity in the area. It occurs in collusion with OAIC, which delivers them to the informal intermediaries, who speculate.

The pastoralist suffers from the superiority of large-scale stockbreeders and traders who forge an alliance with the local public institutions and maintain power networks (Ancey et al., 2003). Even in many Organisation for Economic Co-operation and Development (OECD) countries where policies are well implemented, and controlled by government, stabilizing prices (minimum intervention prices for produces and income payments that linked to the evolution of prices or returns) induce more risky farming practices and have the opposite effect (Antón et al., 2011).

In addition, 98 per cent of the sedentary, nomad and transhumant breeders don't make profit from the credit facilities whose activities are informal and/or of the loan with interest prohibition and the strong family solidarity. With this local approach are added an optimal strategy of private risk management (maximum profit obtained in situation), weak natural insurance and systemic character prevail in the study field. Their associations show observed facts of a modest development for private local risk management tools (Sommarat et al., 2013; Santos & Barrett, 2011; Gaurav et al., 2010). Besides that, formal insurance contracts are rarely available for pastoralists in the arid and semiarid lands. Although a rich literature analyzes the wide array of informal social arrangements and diversification strategies that these farmers employ against risk, *in nearly all cases these processes are not highly effective and in many cases carry very high implicit insurance premium* (Sommarat et al., 2013; Murphy, 2012; Santos & Barrett, 2011)

The public intervention thus does not take into account the reality of the breeding sector and hasn't solved the farmers' risk exposure problems (Aimin, 2010; Tomek & Peterson, 2001). Except if is to encourage them to leave that (informal activity, social insurance arrangements, interest prohibition), nevertheless this objective is not also reached until now (Sommarat et al., 2013; Aimin, 2010). Several measures contribute more or less to the risks incurred by the nomadic, transhumant migration and sedentary producers, according to the level of the input incorporation and drama for small-scale breeders after high amplitude of risks (Antón et al., 2011; Aimin, 2010; Just & Pope, 2003). *Government payments, as well as production and price-linked measures, affect producers risk exposure, but they also change farmers' risk management behaviour* (Antón et al., 2011).

This spur on the large, medium or small-scale farmers in their respective breeding systems to not model their measures on their traditional practices; thus there are similar preferences among producers now to manage risk or the returns for individual producer look like at a point in time (Dhuyvetter & Herbel, 2013; Just & Pope, 2003). Because while farmers might not be able to influence overall market prices fundamental elements, they do have more control of profitability at the farm level relative to other farmers (Dhuyvetter & Herbel, 2013).

About sales units according to the S and their forecasting, the explanation follows from the internal functioning sheep market (Aimin, 2010). They are related to the volume of lambs placed on the markets according to the biological cycle, the herd size management in the three breeding systems and the coincidence with CAFI shortage period (Atchemdi, 2008). For keeping up the sheep selling, sales force isn't separated from the marketing in order to be effective and less expensive; the informal contracts are founded on a controlled familiar network (Sommarat et al., 2013; Santos & Barrett, 2011; Huysentruyt et al., 2009). The way changes structural costs into variable costs and allows to reduce marketing budget during S3 of low-demand and takes thus into account the reality of seasonal produces (Dhuyvetter & Herbel, 2013; Zeyl & Dayan, 2003). Conjunction of these facts contributes to accentuate the phenomena, with different amplitudes according to the level of each or when other climatic factors come to be added to it, even the transmission of word commodity prices to domestic marketplaces (Murphy, 2012; Baffes & Gardner, 2003).

The strategies consequences on internal functioning market are thus from the way in which the various pastoralists interpret the local markets risks and react to it. They make decisions on a daily basis that are often based on some type of forecast such as price, weather, or climate: price-based decisions, weather-based decisions, and Climate-based decisions (pre-season decisions and tend to be more strategic in nature) (Crane et al., 2010; Fraisse et al., 2004). For example, the farmers and their clients know, from experience that, the sheep production is specifically seasonal in short term and the natural plant depend more completely on the rainfall of S2 and S4 than government policies (Westhoff, 2010; Atchemdi, 2008). When the two seasons are not rainy, that is considered as a risk, and lead to precautionary buying or selling and an inevitable speculation of the markets stakeholders; *for a producer or a buyer, speculation consists of doing nothing to hedge his price risk* (Aimin, 2010). Another example in the same way, in India, practically 9/10 households in a recent survey report that variation in local rainfall is the most significant risk they face. Of course experiments in behavior demonstrate that producers have an intuitive understanding of the correlation between rainfalls and yield (Gaurav et al., 2010).

We were certain that the other measures are not enough to manage the risks and there is not an establishment of a connection between the whole instruments and the seasonal variation, to found the insurance effect i.e. to have the conviction that they prevent the risks and their economic effects on them. According to Barry & Fraser (1976); in USA, annual coefficients of variation for monthly prices of selected commodities over 1959-1974 period reflect irregular influences on prices. The increasing effects of irregular influences on intrayear price variation are clearly evident for crops and to a lesser degree for livestock. In Canada majority of producers are in a sample faceing negative correlation between price and yield for wheat, barley and oilseeds.

The research indicates that, for s Pastoralist households, in particular mall farms, it is the climate,

investment and feeding inputs to determine their stability, and the animal combination is not the key factor. Low level of investment in herd, notably herd size management, optimal combination of animal feed resource or source of feed inputs are to avoid risks, to bring a higher income (Aimin, 2010). Indeed, the relatively weak correlation of returns across crops makes diversification a viable strategy for reducing the variability of returns. Farm income variance is reduced by diversification (-10 to -28%) and by prices and yield changes offsetting each other (-2 to -25%) in 4 Organization for Economic Co-operation and Development OECD countries (Italy, Estonia, Australia and United Kingdom. Thus, they benefit from natural hedging between prices and yields (Antón et al., 2011).

Thus, expenditures in CAFI is not the indispensable strategy which leads stockbreeders to maintain a great sheep population on grazing land without it capacity and without running a risk (Ancey et al., 2003). It is then important for the producers to control simultaneously the CAFI and lambing (even period) in order to optimize the profit rate and to minimize the total costs. *The empirical findings show that prices are significantly influenced by production costs and the degree of competition among meat processors (*Pieniadz & Hockmann, 2004). The government policies must also attend to this aspect, for more efficiency (Just & Pope, 2003).

In short run a deficit in supply for sheep in S3, in the absence of competing produces, and fall in CAFI price during S1 increase the flock price to the level such as the selling price goes up by 0.25 to 4.10% compared to the seasonal average (Atchemdi, 2008). Contrary to that, the BS with the high-offer of sheep, can involve low-income for stockbreeder, following decreased price; the fall in animal prices, compared to the same seasonal variation, goes down by -2.18 (S2) to -2.17%.

Demand being often very little elastic against price, for produce, we understand well that a strong unexpected increase in production could not be absorbed by households and that will thus follow by decrease in price (Murphy, 2012; McCreary, 2012; Antón et al., 2011). In the same way, other factors are susceptible to oscillate the prices within a year, independently of any climate variation (Crane et al., 2010). For example, religious feasts, with government transfer policy, could strongly modify demand within the GS (2004, 2008, and 2009). During several production cycles, the fluctuations are related to the same phenomena, with their intensity and hazardous combinations. In fact, within the same year and through several production cycles of the sheep, the economic and natural risks levels, as well as the profit rate would not be the same for the stockbreeders (Munier, 2012; Antón et al., 2011; Crane et al., 2010; Fraisse et al., 2004).

Concerning risk taking premium, which has also a lot of consequences on the breeding system; these are four facts which explain it (Dhuyvetter & Herbel, 2013). They know first that government makes itself contribution to struggle against all the farms constraints, which do not allow them to reach result targets, even if all these instruments are not met the required result (Antón et al., 2011; Aimin, 2010; Just & Pope, 2003). Then, they know with King's law the inefficiency and imperfection of the agricultural produces markets since the end of 17th century. And at the very beginning of the 3rd millennium, we see the increasing in price fluctuation of agricultural foods and produces (McCreary, 2012; Jones & Kwiecinski, 2010). The sudden increase and drop in prices on the markets have disastrous consequences on the producers and consumers (Munier, 2012). Finally, the economic risks in interaction with the natural constraints are also inherent in the breeding system (Atchemdi, 2008). There are their technical solutions to manage them more or less well which

encourage them to continue their production. For that it's necessary to have recourse to all the possibilities of strengthening the stockbreeders and public measures for managing farm risk which are any more fixed or suitable to such or such breeding system (Dhuyvetter & Herbel, 2013; Antón et al., 2011; Aimin, 2010; Just & Pope, 2003)

With that development, the stockbreeders are convinced of the breeding system is full of risks (Munier, 2012). And when their internal functioning systems of production and risk strategies with those of the government do not converge, they adapt to be exposed to the dangers in hope to obtain an economic advantage (Dhuyvetter & Herbel, 2013; Antón et al., 2011). Finally, the important fact, which attracts the stockbreeders and the financing, in spite of the important risk effects, related to our problems, is the profit rate from 15 to 38% in the farm sector. By the way, in the context of the risked markets, the balance prices change unceasingly between several extremes. The stockbreeders and sellers, at all the levels, obtain risk taking premium, which appear in the accounts results as profits, but which are not monopoly rents (Antón et al., 2011; Piketty & Boussard, 2002).

5. CONCLUSIONS

It's very important to know the seasonal variation in the farm production and their prices and how the producers manage risk based on the government policies. That makes it possible to develop the activities more remunerative prices for producer and more useful for household, even if, the natural and economic risk severity makes measures sometimes ineffective and can occur separately ones and others. Other researches confirm that the risk management (sheep breeders' strategies and government policies) must take into account the seasonal fluctuation and the specificity of each breeding system to be more efficient. They show also that high profit rates which attract stockbreeders and investors, with disastrous consequences on breeding resources.

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APPENDIX

Appendix 1. Temperature (°C) in Districts of Djelfa and Ain El Bell

Area	Month	Jan.	Fe.	Mar.	Ap.	May.	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
Djelfa	m	0	1	3	6	10	15	19	18	14	10	4	1
	M	9	11	16	18	23	30	34	33	26	21	14	10
	M+m/2	4	6	10	12	17	23	27	25	20	16	9	6
Ain ElBell	m	1	2	5	7	12	16	20	19	15	11	5	3
	M	12	14	18	21	26	32	37	35	29	24	16	12
	M+m/2	6	8	11	14	19	24	28	27	22	18	11	8
	N F	15	9	4	1	0	0	0	0	0	0	4	10

Legend:m= Minimum; M= Maximum; NF= Number of day of frost

Source. Data of National Meteorological Office of Djelfa (NMOD), 2011

Appendix 2. Precipitation (mm) in Districts of Djelfa and Ain El Bell

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Aver.
P	152	238	212	295	376	247	288	297	337	387	311	299
Month	Jan	Fe.	Mar.	Ap.	May.	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
P Djelfa	25	23	18	25	27	12	10	21	39	30	27	27
P Ain El Bell	22	21	16	22	24	11	9	19	34	27	24	24
Month	Jan.	Fe.	Mar.	Ap.	May.	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
N P	7	6	5	5	6	4	4	3	7	6	6	9

Legend: P= Precipitation; NP= Number of day precipitation

Source. Source. Data of National Meteorological Office of Djelfa (NMOD), 2011

Appendix 3. Animal price and feed price Unite= DA; 100DA, Dinar Algerian=1.08euro

Year		sheep				
	Season	**S1**	**S2**	**S3**	**S4**	**Average**
2003 – 2011	Lamb	11344.13	10896.95	10797.12	10867.24	10976.36
	Teg	15024.86	12596.24	13683.88	14034.81	13834.94
	Ram	23679.22	23396.62	23689.24	23609.79	23593.71
	Ewe	12991.36	12342.00	12536.78	10724.67	12148.68
	Average	15759.89	14807.95	15176.75	14809.13	15138.42
		Animal Feed Resource				
	Common wheat	1583.36	1416.87	1451.92	1648.34	1525.12
	Barley	1651.70	1567.38	1433.39	1626.31	1569.69

Source. Data of Institute for National Agricultural Research of Algeria (INARA) in Djelfa, 2011

Appendix 4. Main survey questionnaires in the two districts

N°: Date: Place: Tribe: Age: Farmer:

Part 1: Sheep number and breeding practices

-Average sheep number according to sheep category; Average number (head) /year in good season; Average number (head) / in bad season and by sheep category;

Breeding system and sheep number in the two districts

Breeding system	Small-scale farmer	Medium-scale farmer	Large-scale farmer
Nomadic			
Transhumant			
Sedentary			

Part 2. Breeding practices

Race of sheep population

Race	Sex	%	Resistance to dryness	Resistance to spatial migration	Very cheap	Very expensive	Market demand
Rembi							
Ouled djelal							
Taadmit							

Breeding system and importance of risk measures

Breeding system	In 2 disticts	Percent
Nomadic		
Transhumant		
Sedentary		
Others		

- Herd size management; Good season (GS); Bad season (BS); Factors of herd size management

Production cost (DA)

Case of Good season (GS)

Catégoriy	Ewe	Lamb	Teg	Ram	Others	Total
Cost/ unit						
Coût/ 3 units						
Coût/ 8 units						
% Variation with number						

Case of Bad season (BS)

Catégory	Ewe	Lamb	Teg	Ram	Others	Total
Cost/ unit						
Coût/ 3 units						
Coût/ 8 units						
% Variation with number						

-Question about agricultural soil; Irrigated forage

Pasture hiring for their sheep

Private……/3 months……/year……/other (explain)

Collective……../ months……../year……/other (explain)

Public (forage plantation)……../month……./year……/other (explain)

Public (regulated)……/month……/year……/other (explain)

-And change with the GS and BS; Access to water ; Constraints during the nomadic or transhumant migration; Migration and additional excess of income; Explain; Additional profit rate(%); Migration factors during year

Production cost

Cost	Feed	Water	Land hiring	Drugs	Transport	Tax	Income	Others	Total
GS (DA)									
%									
BS (DA)									
%									

Spatial migration, pasture and water access (Percent)

Spatial movement	Access to pasture	Access to water
Yes	Free	Paying and painful
No	Not free	Free water (rivers, dams, wells)
Price variation in bad season		
Farmer		
Rise rate		

Sale price (animal) (DA)

Case of GS

Category	Average Age		Average profit (by /production cost (Farmer)	Market demand	Total
	Market price	Sale price (farmer)			
Ewe					
Lamb					
Teg					
Ram					
Others					

Case of BS

Category	Average Age		Average profit (by /production cost (Farmer)	Market demand	Total
	Market price	Sale price (farmer)			
Ewe					
Lamb					
Teg					
Ram					
Others					

Profit /category of sheep

Category	**Average Age**	**Average profit**
Ewe		
Lamb		
Teg		
Ram		

Part 3: Questions concerning Marketing and Commercial action

-Marketplaces and commercial networks (formal or informal, selling with cattle trader on farm, contract for commercial function); Social arrangements; Clientele and the markets; Seasonal Sale Volumes; Whole Annual Sale; Sales force; Advertising budget; Ability to predict future of agricultural markets; Understanding why sheep prices rise and fall; Conflicting factors that impact feed and sheep; Solutions for sudden fall in sheep prices.

Calendar price

Category	Average Age		Months J	F	M	A	M	J	J	A	S	O	N	D	Normal price	GS price	BS price
Ewe		High															
		Low															
Lamb		High															
		Low															
Teg		High															
		Low															
Ram		High															
		Low															
others (explain)		High															
		Low															

Part 4: Question about use of Concentrated Animal Feed Input (CAFI)

-Beginning (year) of the use of the CIFA; Intra-annual use of the CAFFI and period of CIFA shortage; Period of great consumption of the CIFA; Marketplaces and commercial networks (formal or informal, selling with herd seller on farm, contract for commercial function)

Ration/animal and/day

Animal category	Type of feed	Period	Daily feed ration	Reason
Ewe				
Lamb				
Teg				
Ram				

-Evolution of concentrated animal feeding operations; Understanding why feed prices rise and fall; Solutions for sudden rise in feed prices; Government policy for pastoralist.

Importance for each breeding system

Breeding system	Small-scale farmer	Medium-scale farmer	Large-scale farmer	Interest	Influencing market fundamentals	Profit of credit facilities	Interest prohibition
Nomadic							
Transhumant							
Sedentary							

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المخاطر التي تواجه المنتجين الموجه إنتاجهم للسوق في الجزائر

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ملخص

يقدم هذا البحث قاعدة صلبة لنقاش الصعوبات التي تواجه المنتجين الموجه انتاجهم بشكل مباشر للسوق بوساطة " Solveur Microsoft Excel" الذي هو نموذج التحليل"Solsamp" سلسلة التسويق و قوة البيع. و قد استخدم نموذج " لتحليل المعطيات العملية (2003 –2011) المجمعة عن منطقتي (عين الرومية وبلدية الجلفة). وقد اثبتت النتائج أن الاجراءات الاحتياطية و الوقائية كانت غير فاعلية في مواجهة العون الطبيعي والتحكم في العوامل الاساسية لأسعار السوق(العرض والطلب) . وهذه الاخيرة قد تؤدي الى اخطار في نفس الفصل بشكل مستقل عن تذبذبات المناخ. معتمدين بشكل جزئي او كلي على اجراءات الدعم الحكومية، اعتمد الرعاة المقيمين والرُّحَّل في استراتيجيتهم على استخدام التغذية المركزة والتخزين– استخدام المخزون وهده الاخيرة تتقاطع مع عملية الترحال في كل النقاط. لكن دلك لم يقض على الاخطار التي تختلف مستوياتها من دورة انتاج لأخرى تبعا لمدى كثافتها ولمدى الخسائر الناتجة عن عدم الفاعلية الاقتصادية .لكن تسييرها ضمن لهم معدلات هامش ربح خام تتراوح بين 15 (الشتاء) الى 33 (الصيف) وبشكل متعاكس مع المعامل الموسمي المرتفع شتاء (1.25) والمنخفض الى اقل من (0.86) في الصيف. واظهرت الاعمال المثبتة المرتبطة بعمل اسواق الاغنام الداخلي أنه لا يوجد ارتباط للإجراءات وللمؤشرات الموسمية بتأسيس اثر التامين، والمنتجون يفضلون تحمل الاخطار بهدف تحقيق نوعا من المردودية.

الكلمات الدالة: تسيير الاخطار، التسويق الفلاحي، النموذجة الاقتصادية، الأداء الاقتصادي.

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