

REVIEW ARTICLE [ARTICULO DE REVISIÓN]

*Tropical and
Subtropical
Agroecosystems*

TOOLS FOR TECHNOLOGY TRANSFER IN THE FRENCH CAPRINE
SECTOR

[HERRAMIENTAS PARA LA TRANSFERENCIA DE TECNOLOGÍA EN EL
SECTOR CAPRINO FRANCÉS]

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SUMMARY

The modernisation and the dairy specialization of the French goat sector have both been the result of an organized strategy at a national level for 50 years. Thanks to this strategy, called the “chain of progress”, the French production of cheese from goat milk has increased three fold during the last 50 years production (around 100,000 tons in 2007). The chain of progress – which involves organizations of research and development and professional breeders organizations - is divided into 4 steps: 1) identification of technical, economic or social brakes to modernization and productivity, 2) development of research programmes, 3) tests of application methods with critical evaluation, 4) diffusion with various tools : training courses for technicians and breeders, technical days and systematic use of the review *La Chèvre* which celebrates 50 years of existence in 2008. The newspaper *La Chèvre* (French term for “goat”) has always been a powerful tool which disseminates technical news quickly. It has shortened the time between the acquisition of research results and their dissemination to breeders. Nowadays, *La Chèvre* distributes 4,000 issues every two months. It is read by more than half of the French goat breeders (3,600 subscribers out of the 5,600 breeders who owned more than 10 goats in 2007 in France). The review, which is about 50 pages, gives a progress report on caprine news with a recurring article on current markets and milk prices. A complete file gives details about techniques for breeding: feeding, animal health, reproduction and selection, equipment and buildings, farm management, transformation and marketing of cheeses.

Key words: *Technology transfer, France, review, La Chèvre*

INTRODUCTION

France is the first goat's milk producer in Europe with 580 million litres produces in 2006. The 5.600 goat's stockbreeders regarded as professionals (with more

than 10 goats) hold 856,000 goats. Goat's breeding is not the principal production of ruminant in France consider milk and suckler cows concern more than 200,000 stockbreeders (Table 1).

Table 1: The French livestock of ruminants

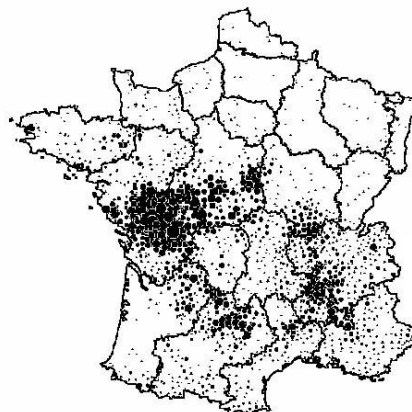
	Goats	Milk cows	Suckler cows	Dairy ewes	Suckler ewes
Farms (Thousands)	5.6	97.0	130.0	5.3	6.6 (+ 1000)
Livestock (millions)	1.2	3.8	4.0	1.6	4.8

Goat's farms are concentrated in two principal zones:

- one formed by the basin of the Western Center (Poitou-Charente and Pays-de-la-Loire) and, in continuity, région Centre,
- the other in South-east, in particular in Rhône-Alpes area.

These two zones add up 62% of the whole of goats dairy farms. The other farms are dispersed in the southern part of the country, with some denser hearths in the north of Aquitaine and of Midi-Pyrenées and a rather strong presence on the Mediterranean circumference and Corsica (Figure 1).

Figure 1: Goat's density in France -Source: Agreste



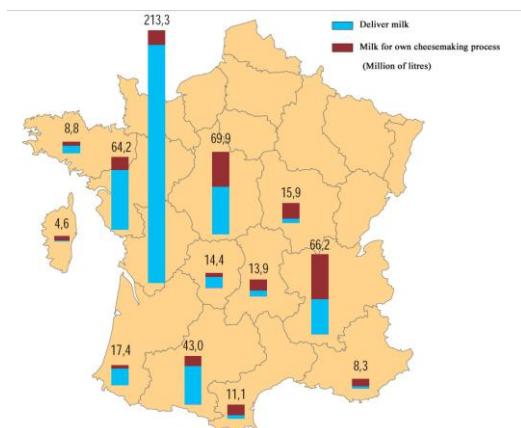
A characteristic of the French goats breeding is the presence of two kinds of orientation of dairy production. Half of the dairy farmers deliver their milk to dairy industries - co-operative or private -, 45% are cheesemakers and process their own milk and 5% are mixed and sell milk and cheeses (Table 2).

Table 2: Description of French goats farms according to orientation of dairy production

	Cheesemakers	Milk delivermen	Mixed
Farms rate	45 %	50 %	5 %
Distribution of goats by kind of production	23 %	71 %	6 %
Average size flocks	64 goats	179 goats	148 goats
Distribution of dairy production	18 %	77 %	6 %

As indicated in chart 2, the delivery to dairy industries dominates very clearly in the Mid-west and South-west. Cheesemakers are numerous in Centre area, in South-east and in the Rhône-Alpes.

Map 2 – Goat milk production in 2005 – Source: Agreste



In 2007, 103000 tons of goat's milk cheeses were manufactured in France: 88,000 tons by dairying and approximately 15.000 tons by farm cheesemakers. Goat's milk cheese has increase threefold in 50 years. If goat's milk production hasn't ceased increasing for these 15 last years, number of goat farms decrease with their modernization and dairy specialisation (Table 3).

Table 3: Evolution of French goat sector these ten last year – source : Institut de l'élevage

	1995	2000	2007
Goats	828 000	843 000	856 000
Farms with more than ten goats	11 200	8 400	5 600
Production (l)	430 000	485 000	576 000
Milk delivered to dairy industries (l)	270 000	331 000	423 000
Average milk by goat and by year (l)	724	760	793

Moreover, these goat farms are more professional and more technical. They need more powerful technical assistance. For example, more than 40 % of French goats are in milk recording. About 10 % of French goats are inseminated every year. The modernization and the dairy specialization of the French caprine sector have both been the result of an organized strategy at a national level. Many structures were necessary to assist goat farmer.

I. Caprine sector structures

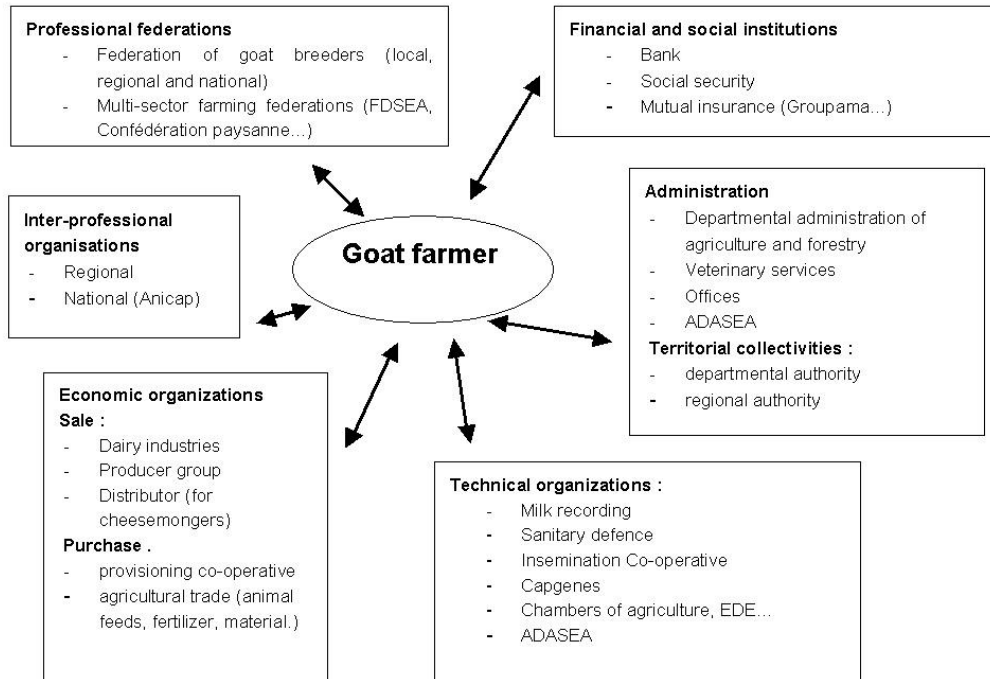
1.1 Caprine sector organization As the other French agricultural sector, caprine sector is equipped with many structures with specific roles, missions and statutes:

- Professional livestock federations represent goat's farmer for administrations and dairy industries.
- Inter-professional organisations have vocation to gather all sector, both milk producers and dairy industries.
- Others organization (GIE Lait viande et Office de l'élevage) try to set up orientation actions for caprine sector, on regional and national levels. Office de l'élevage is the administration in charge with subsidies payment, dialogue between administration and professionals and orientation.
- ADASEA is the structure in charge with administrative and technical support for young farmers.
- Others organization intervene in the technical fields to undertake research and develop techniques of breeding, milk's transformation or marketing (Figure 1).

A lot of this organizations are controlled by farmers: professional federations, technical organizations, some of bank or mutual insurance, producer group and co-operative dairy industries. Goat milk co-operative dairy industries are similar size that private dairy industries. For example, one of them controlled by

farmers, Eurial-Poitouraine, collect and transform 135 million goat milk litres. This co-operative dairy industries employ about 1,200 people and sell cheeses, milk and butter for € 520 million.

Figure 1: Goat farmers are in relation with many structures



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The French dairy sector is structured around two poles: the federation of goats farmers and the dairy industries which gather in inter-professional organisation (Figure 2).

Goats farmers and dairy industries discuss in inter-professional organisation to establish priorities of actions, research and development of goat sector.

I.2.a Organizations with direct contact with goat farmers

Departmental chambers of agriculture. These professional public organisations are official and permanent advisory public authorities. Chambers of agriculture work for the general interests of all farmers.

Chambers of agriculture have two main missions:

- an advisory mission with public authorities and territorial collectivities,
- a mission of intervention, thanks to technicians and engineers teams, by proposing many services for farmers.

The departmental chambers of agriculture are declined at the regional level even if the regional chambers of agriculture are not be in direct contact with farmers but provide services to departmental chambers or animate class action suits (promotion of regional products, training for technicians, representation near the regional public authorities...).

At national level, APCA (the chambers of agriculture standing committee) represents chambers near the national and European public authorities. It also analyzes agriculture's strategy for departmental and regional chambers.

Departmental establishments of breeding (EDE: Etablissements départementaux de l'élevage). Departmental establishments of breeding have missions fixed by law relating to livestock identification. They also give technical assistance to

allow breeding development and production systems improvement. In many departments, EDE is a service of chambers of agriculture

Milk recording organizations

Milk recording organizations control dairy performances according to national protocols. They also give technical assistance to farmers. Milk recording is the key to select the best goats and he-goats and to program couplings. About 360,000 goats are recorded yearly (more than 40 % of all French goat). 1,900 goat farmers use milk recording services. Milk recording organizations are federated at regional (FRCL) and national level (FCL: France Contrôle Laitier).

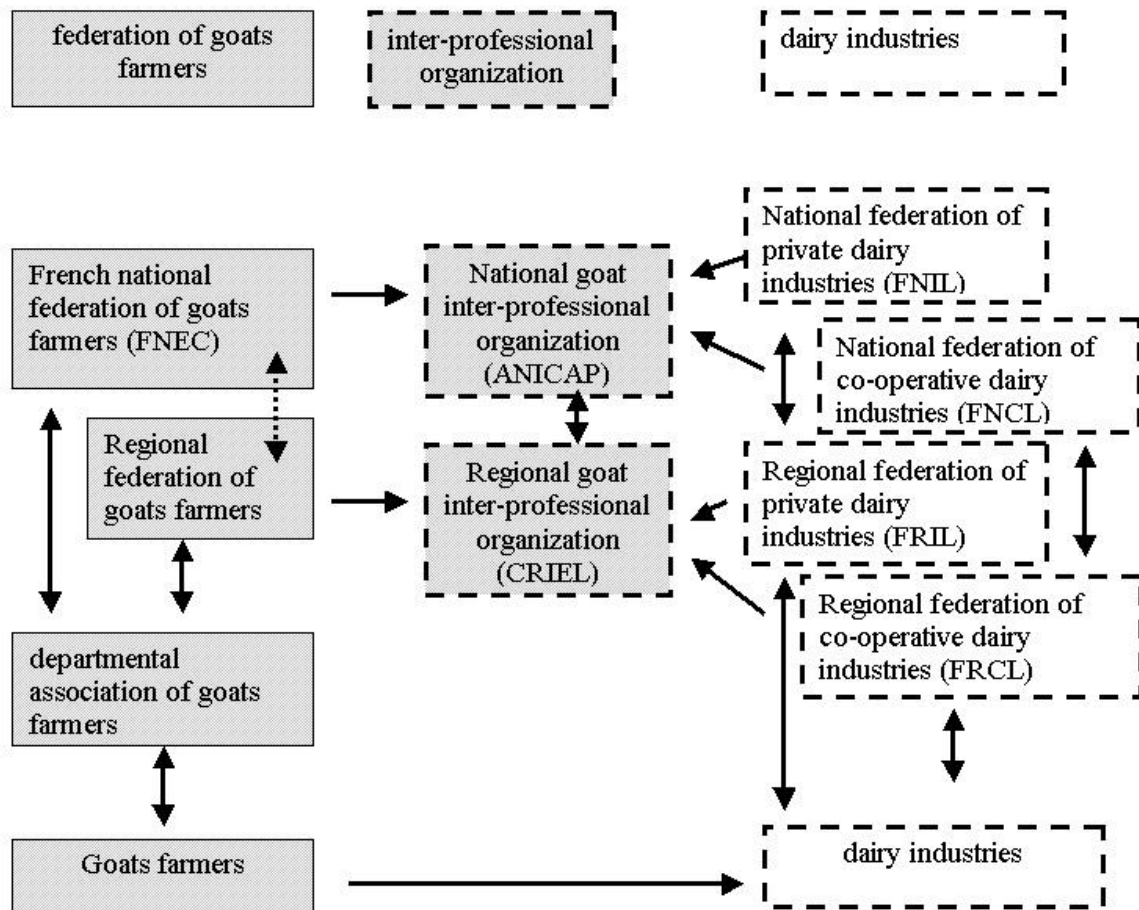
Artificial insemination co-operatives

Artificial insemination co-operatives are in charge of genetic progress diffusion by artificial insemination. Every year, about 80,000 goats are inseminated (about 10 % of all French goat).

Sanitary defence organizations (GDS: groupement de défense sanitaire)

Sanitary defence organizations were created by stockbreeders and administration. It's a kind of relay between departmental sanitary services (administration) and stockbreeders for better fighting against principal animal diseases. GDS help veterinary services in official disease prevention. GDS manage collective medical cleansing program. They also propose personalised services for farmers in animal health, hygiene and sanitary quality. GDS are federated at regional (FRGDS) and national level (FNGDS).

Figure 2: Relationship between federation of goats farmers, dairy industries and inter-professional organization



In this article, we will only describe the specialized organizations for technology transfers and we will exclude description of federation of goats farmers, inter-professional organisation and administration, in spite of the fact that this kind of organization can sometime play a role into technology transfers.

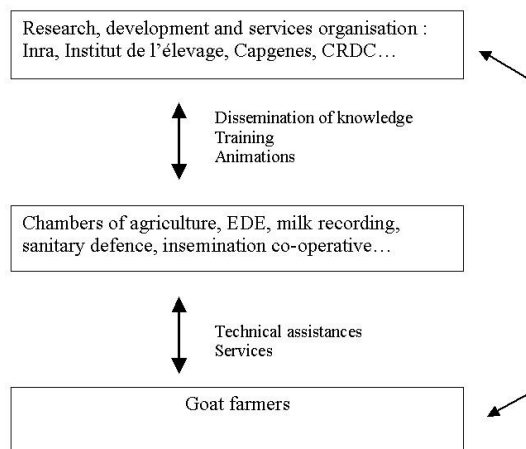
1.2 Technical organizations

There are many agricultural technical organizations in France. Some of them are specific to goat sector and some are for many agricultural productions. This organizations have sometime different levels: departmental, regional or national. There are two kinds of organizations:

- Organisations with direct contact with goat farmers
- Organisation without direct contact with goat farmers

The goat's technical development involves permanent exchanges between goat farmers and technicians on one hand and between these technicians and research, development and services institution on the other hand (Figure 3).

Figure 3: Technology transfer in the French caprine sector



1.2.a organizations with direct contact with goat farmers

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Meat producer groups

Meat producer groups (association, co-operative...) collect, fatten and sometimes market kids and cast goats. Sometimes, they supply farmers with dried milk.

Quality groupings and associations of products

An official sign of quality (AOC, Red Label, AOP, IGP...) must be represented by a defence association of product or a quality grouping which gathers people for being recognized and accepted by public authorities. These structures define and control practices defined in schedule of conditions, ensure market management, take care of legal protection of the product and promote the cheese. They take care of political cohesion and representation of sector on interns, local and national level.

In France, 12 goat cheeses have an AOC (protected designation of origin). 6,300 tons of AOC goat cheese are sold every year (about 6 % of all goat cheese product).

I.2.b Multi-sector organization without direct contact with goat farmers

INRA (agronomic national research institute)

INRA (Institut national de la recherche agronomique) is a public organization charged to produce and diffuse scientific knowledge about agriculture, food and environment. In caprine sector, teams work on reproduction, animal feeding, grazing, parasitism and genetics, in partnership with other structures (regional research centres, livestock technical institute, milk recording...).

Livestock technical institute

National livestock technical institute (Institut de l'élevage) is an applied research and development institution for breeding herbivores (cattle, sheep, goats and horses). About 240 technicians and engineers work for it in Paris and in 11 other sites in France. It is directed by representatives of professional livestock federations who are members of its board of directors.

The general mission of livestock technical institute is to provide innovation and gathering knowledge for breeding herbivores.

Livestock institute bring expertise and consultancy on livestock organisation, modernisation and competitiveness. It works on adapting breeding and systems to socially aware requirements (food safety, animal welfare and environment).

In caprine sector, livestock institute manages a national group of reflexion and research on reproduction and a domestic network of grazing technicians. It also manages a network of 200 goat farms in technical and economic references. Livestock

institute designs and implements campaigns of collective advice and individual technical support methods. It also manages a network of cheese-making technicians and the "mutual code of good practices in goat farms". For the transfer of knowledge to farmers, livestock institute organises every year technical training for about a thousand technicians, engineers and managers of organisations and companies working with livestock farmers. Livestock institute organises and leads seminars, symposia and technical days. It publishes works and practical guides (more than 250 catalogue reference). The website (www.inst-elevage.asso.fr) disseminates advices and technical supports to technicians and farmers.

I.2.c Goat organization without direct contact with goat farmers

Capgenes

Capgenes is the unique organisation of goat's genetic selection in France. It defines selection's objectives. Capgenes qualifies and certifies reproducers and manages racial national database (170 000 goats – mainly Alpine and Saanen). Capgenes gathers approximately 800 goat farmers and 22 artificial insemination co-operatives. Capgenes manages the only production centre of frozen caprine semen in France.

ITPLC (technical institute of the caprine dairy products)

ITPLC (Institut technique des produits laitiers caprins) contributes to a better valorization of caprine dairy production with research. Its fields of research are goat's milk as raw material, dairy technology, quality of cheese and food safety.

CRDC (Resource centre and caprine documentation)

CRDC (Centre de resource et de documentation caprine) is the service of documentation of ITPLC. It proposes a large amount of scientific and technical documentation for all caprine sector. CRDC diffuses synthetic scientist and technological news. The website (www.crdc.fr) provides a large part of documentation.

Regional research centres

Regional research centres (regional experimental station of Pradel in Rhône-Alpes, cheese-making center of Carmejane in Provence-Alpes-Côte d'azur, cheese-making center of Mâcon Davailé in Bourgogne, cheese-making center of Région Centre) have a research and experimentation activity in the field of cheese-making transformation. They also give technical support to farmers as well as formations. They work in partnership between them and with

national structures (livestock institut, INRA...). In Rhône-Alpes area, experimental station of Pradel has moreover research activities in grazing and goats breeding. A special link between this station and farmers of the area is ensured by a specific structure, the PEP caprine.

II Knowledge and technology transfer

II.1 Chain of progress

The modernisation and the dairy specialization of the French caprine sector have both been the result of an organized strategy at a national level. This strategy is called the “chain of progress”. The chain of progress involves organizations of research and development and professional breeders organizations.

The chain of progress is divided into 4 steps:

- identification of technical, economic or social brakes to modernization and productivity,
- development of research programmes,
- tests of application methods with critical evaluation,
- diffusion with various tools : training courses for technicians and breeders, technical days and review *La Chèvre*.

II.2 Three examples of chain of progress

Working conditions program

In 2005, the French national federation of goat farmers (FNEC) identified “working conditions” as an essential issue for research and development in goat milk sector : indeed, goat farmers increasingly express the need of having their workload lightened. The burden of constraints and the number of hours and week-end work make this profession less attractive for young people.

That’s why FNEC decided to lead a large research and development project about that issue, involving research centers, development structures, technical support organizations, etc. In the end, forty-eight partners from all parts of France were part of this program. Centre Fromager de Carmejane, a technical research and development center from the south of France realized the technical and administrative management of the program.

The first action of the program consisted in collecting data about how to reduce or how to make easier the workload of goat farmers. Groups of farmers and livestock technicians gathered bibliography and used their own knowledge (often useful, but not formalized) to create synthesis on several subjects: farm building, feeding, kid breeding, etc...

In the second action, partners who had experimental means realized experimentations about breeding practice that could reduce workload. Its consequences on work time, on constraints, but also on profitability, and on products’ quality. For example, experiments were led about milking one time per day (instead of two), different methods of cleaning, and surveys were realized on food distribution.

In 2007, at the end of the program, 23 technical articles were written intended for farmers. FNEC and its partners wanted to transfer these results towards every goat farmer in France. 6000 CD-Rom were edited, and given to farmers through local development structures involved in the program, or during one of three regional symposiums organized for producers on this issue. All articles are also available on Internet: www.fnec.fr.

The mutual code of good practices in caprine breeding: a tool for knowledge transfer

In 2003, the national caprine inter-profession (Anicap) signed an agreement instituting the mutual Code of good practices in caprine breeding. This mutual Code wants to be a chain of progress and development tool. It helps farmers to understand laws and controls of breeding practices.

The farmer accompanied by a technician compares his practices with a reference frame which covers technical fields and lawful. If necessary, the improvements to be brought are defined, always with support of technician. In that way, join the mutual code is a way to progress.

Since 2004, date of first adhesions, 1 600 goats farmers are engaged into mutual code with help of organisations with direct contact with goat farmers.

The newspaper *La Chèvre* and the website

Found in 1958, the newspaper *La Chèvre* (French term for “The goat”) has always been a powerful tool which disseminates technical news quickly. It has shortened the time between the acquisition of research results and their dissemination to breeders.

Figure 3. Front pages of *La Chèvre*

La Chèvre is the only professional review specialized in goats breeding in France. The readers concerned are professional goat farmers. Readers are expert, critical and ask for improve their know-how. If target includes farmers, a second perimeter includes all the caprine sector. The review is also read out of France (approximately 5% of subscribed), by French-speaking people of Belgium, Switzerland, Quebec, North-Africa

and farther. *La Chèvre* has 3.600 paying subscribers from which more of two thirds are specialized goat farmers (200 goats on average). Rhythm of publication stays every two-month (six numbers per year) since its creation. Its penetration rate is estimated at 40% (out of 5.600 farms with more than 10 goats). 75% of the subscribers subscribe again the following year – which show consumer loyalty and attachment to the review. In areas with weak caprine density, *La Chèvre* is one of the only link with caprine sector. The review, which is about 50 pages, gives a progress report on caprine news with a recurring article on current markets and milk prices. A complete file gives details about techniques for breeding: feeding, animal health, reproduction and selection, equipment and buildings, farm management, transformation and marketing of cheeses. A lot of this knowledge is coming from livestock institute or from INRA.

La Chèvre try to propose practical information usable by farmers. This information is used for improving knowledge of farmers about a new procedure or a new system. They are based on a didactic and teaching approach. The presentation of examples of successful experiences constitutes the general principle. These examples are a kind of mirror for goats breeders. They can compare their performances and their choices and evaluate their own knowledge.

La Chèvre shows innovations and evolutions in technical, economic, political, administrative and commercial fields. The review gives ideas to help farmers in their strategic choices of method or investment. *La Chèvre* is not an opinion newspaper. It can comment the professional subjects but with an obligation of neutrality, without willing to harm. It has a mediator role between caprine sector's people and with administration and political world. Since July 2007, the website “www.la-chevre.fr” supplements the review and brings additional information and services to breeders (weather, links, small advertisements, breeder schedule). The website became necessary because more than one third of French farmers have now an Internet connection. The website proposes the table of content of current and past issues. It shows “best of” articles classified by heading and by year from 2001. It proposes an on-line forum, classified adverts about goat production and registration to the future newsletter. Selection of links and reference books which goats farmers must have in his library are shown. Every month, about 8,000 people connect to the website.

III Questions for future

The regular fall of the number of goats farmers is asking technical organisation. Do less farmers need same help and advice that many farmers of past years? Like farmers, technical organizations must modernize too and sometime reduce manpower. Technical

organizations must adapt tools and methods for less goat farmers. They need to adapt their diffusion tools for.

Sometimes, a competition is created between organizations which become more and more paying service providers. It is the same for the review *La chèvre* which must absolutely ensure its financial balance with its only resources coming from subscriptions and advertising. Resources of the review come from subscriptions for two thirds and advertising for a third. Because of the low number of subscribed, the review is a little bit expensive (56 euros for one year - six numbers - in France, 77 euros abroad). This price can discourage some goat farmers. We can suppose that not-subscribed farmers are oldest breeders well installed in their system. We can also supposed that they find sufficient information via technical organisation and, recently, via Internet.

More and more, technology transfer is going through economic organizations as dairy industries or feed factories. Dairies industries create, develop and diffuse technical news. They use their own technicians and diffusion tools.

CONCLUSION

Tools for technology transfer available to the French caprine sector have allowed the reorganization of goat farms and development of goat milk production. Now, goat milk production growing and French caprine sector became important.

The technical framing is one key of this success. Development of the caprine sector was possible thanks to an important dairy productivity. This productivity is encouraged by presence of tools as milk recording and artificial insemination. Communication tools as review *La Chèvre* makes it possible to share quickly information in the French caprine sector.

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