

# Changes in production methods in Tandil area in Argentina

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Livestock, farming system, soybean, monoculture, social change, land degradation, Argentina

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## Summary

The pampa territorial transformations are focused on changes in rural land use, marked by the decline of livestock, and the frequent replacement of traditional crops by soybean production. Competition with crops contrived livestock farms to move, and the extensive production has been replaced by intensive systems, in relation with the emergence of new actors. The incorporation of technology in agriculture caused socio-territorial transformations that restructured the rural areas. The article shows the scenarios of change in the rural-land uses in Tandil, through inquiries focused on the progression of the intensification of production (soybean, sowing pools, feedlots) and its results: deterioration of natural resources, displacement of production systems, mainly livestock, monoculture hegemony, and expulsion of rural actors. The theoretical framework is based on the analysis of rural areas, built from rural-urban links, to understand these changes and interpret future scenarios. In the methodology we recorded quantitative and qualitative data through non-structured interviews and compared satellite images of census data (1988 and 2008). As a result, when agricultural profitability and the number of soybean plantations were very high, investment opportunities in other economic sectors were less attractive. Financial, non-agricultural and transnational capital thus progressed along the production chains. These investments have been brought *via* pools of seeds and feedlots, which now control the crop and livestock systems. The new intertwining functions, hierarchies and powers positioned themselves in the local production chain, also globalized in time and space.

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## ■ INTRODUCTION

The global-local processes that motivate actors' adaptation and make a different impact depending on the identity and specificity of the areas (Santos, 1998) have been determining factors of fragility and disparity in the rural spaces. Since the 1990s, the political and economical context has led to deep changes in the territorial organization and rural dynamics, and has redefined the functioning

model of the rural spaces of the pampas. The combined effects of the convertibility law, and of privatizing and deregulating policies deeply disrupted the social, territorial and economical organization of rural spaces. A production model has emerged, which involves much technology and capital, and which is centered on various business sectors (banks, enterprises, industries).

The new rules promote the agricultural expansion and profitability of the biggest companies, which keep expanding by incorporating the lands of medium and small producers. In this context, the rural actors face many difficulties including the need to increase arable areas, competition for land rental, and the deficiencies of public policies, plans and sectorial management. As a consequence, contradictory forces and socio-environmental conflicts increase in the rural spaces of countries such as Argentina; impacts on natural ecosystems emerge and socio-production structures are modified.

The study of territorial transformations in the region of the pampas, with a focus on the analysis of rural spaces, has been included

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in research programs, whose objective is to understand the changes induced by the process of production homogenization in the last two decades. Some authors show that the changes in rural land use are marked by the disappearance of some livestock farms, the replacement of traditional crops by others and the expansion of soybean (Barsky, 2001; Paruelo et al., 2006). The competition with livestock breeding caused also its displacement or replacement, and the extensive livestock production has been replaced by a more intensive one (Barsky and Dávila, 2009; Rearte, 2007; Arceo and Basualdo, 2006) in association with new production actors, such as big companies and “pools of crops” (Reboratti, 2006). The incorporation of technological changes in agriculture caused social, economical and territorial transformations, which were exacerbated by the rural exodus (Sili, 2005) and the restructuring of rural settlements at local and regional levels.

For the last years in the southeast of Buenos Aires Province, investigations related to the transformation of settlements of minor range have been performed, showing the breaking up of the local socio-production fabric and the renewal of urban-rural links (Nogar and Jacinto, 2010). The changes in land uses showed the modalities of the agriculturization process and the displacement of farmers to the southeast of Buenos Aires (Jacinto and Nogar, 2009) and in the rural space of Tandil. The studies show the difficulties that rural actors face from the processes of homogenization and socio-territorial diversification; they emphasize the need to integrate them in future studies in view of developing local territorial management guidelines articulated in a multiscale form.

This article aimed to show the actual scenarios of change in the uses of rural land by studying the progress of production intensification (soybean crop, pools of crops, feedlots) and its results: natural resources deterioration, displacement of production systems, mainly livestock, predominance of a single crop, and expulsion of rural actors. The study was based on a theoretical framework which started from the analysis of rural spaces, a rurality perceived through the urban-rural links, to understand changes and to interpret future scenarios.

#### ■ STUDY LOCATION, SYSTEMS CHARACTERISTICS, METHODOLOGY

The study took place in Tandil, located in the southeast of the Province of Buenos Aires in Argentina (Figure 1). The production systems that defined the uses of rural land in Tandil up to

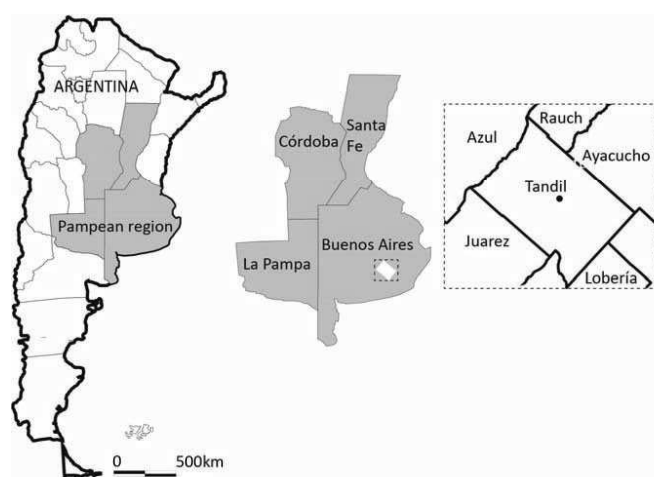


Figure 1: Tandil location in Argentina.

the mid-twentieth century were of the mixed crop-livestock type, which evolved according to national and international demands. The characteristics of the activities and the forms of organization of production determined the pattern of labor incorporation, the rural social structure and the population distribution.

The territory physiography presents hills and plains (Figure 2). Tandil hilly landscape highlights a connectivity and integrity almost natural, based on historical, physio-natural processes, in the social and material networks which make the intraterritorial links viable. Tandil is located at an interfluvial zone, delineating superficial drainage basins such as the upper basin of the streams Arroyos Languyú and Tandileofú in the southwest, the upper basin of the streams Arroyos Chapaleofú Chico and Grande in the northeast, the lower basin of the streams Arroyo El Perdido and Los Manantiales, and the basin of the stream Arroyo El Rabón toward the northwest.

For the methodology we registered quantitative and qualitative data, through non-structured interviews and compared satellite images of census data (1988 and 2008).

#### ■ CHANGES IN PRODUCTION METHODS

In the last decades, changes in the methods and management of rural spaces of production have been simultaneously continual and intensive toward setting up a model led by innovation and the constant search for competitiveness.

In this scenario, the new agricultural actors and investors aim at profitability in a short time, with a production view encouraged by public policies which give priority to growth and not to development. These actors concentrate the management of the systems by optimizing the expansion of investments and plantations from more production zones to marginal zones with the consequent displacement of producers, mainly livestock farmers. Strategies are based on land rental, the adoption of transgenic technologies that intensify the use of supplies, and new forms of storage, among

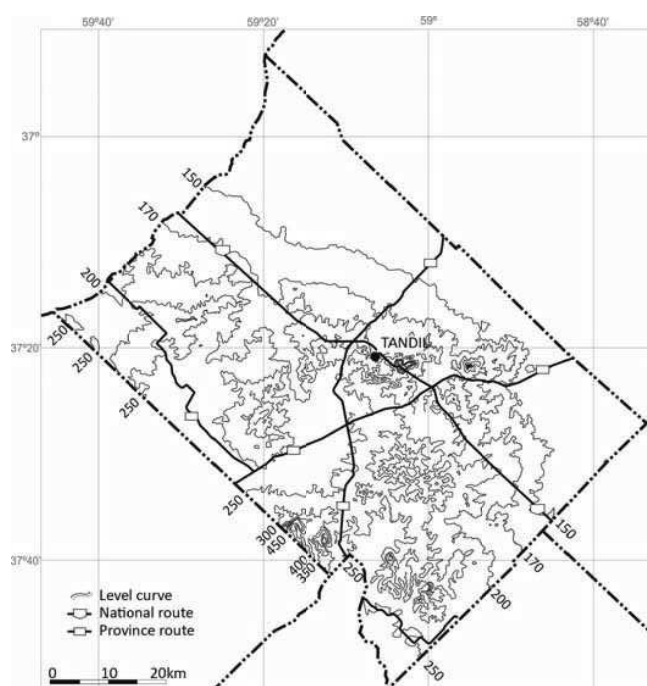


Figure 2: Geoforms of Tandil area, Argentina (Nogar, 2010).

others. As a consequence, the concentration of the economical power is reinforced, guaranteeing the expulsion of actors and systems.

## ■ CHANGES IN PRODUCTION UNITS

The empiric evidence and field works carried out in Tandil show that, in the last years, deep changes in the structure, function and integration of rural spaces occurred:

- The production farms (referred to hereafter as units, a more general term) smaller than 200 hectares have been converted into land for lease. A key-informant representative from an agricultural cooperative observed: “I believe that today a producer who has 200 hectares cannot make a living and gives up because of the high cost of land rental in relation to what can be obtained from the crops. For us, this is very negative not only for economical reasons but also for social ones”.
- The medium-size units presented more resistance, and the owners worked full time in this activity, living in the city of Tandil and making continuous investments.
- A higher percentage of agents have been involved in production methods; the dynamics respond to global and hegemonic trends.

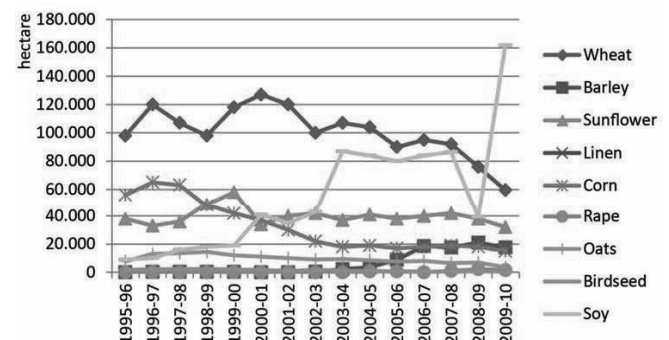
Data from the National Agricultural Census in 1988 and 2002 show that the number of small and medium units decreased and that production units of more than 1000 hectares increased (Table I). Similarly, they show a decrease in land space for rural use from 477,023 hectares in 1988 to 442,390 hectares in 2002.

Figure 3 shows the agricultural expansion from the mid 1990s, explained by an increase in productivity (technological changes, non-agricultural capitals) and in planted areas, by the use of soybean as the leading crop, by an increase in the international demand, and by pools of crops and contractors of production. The synergy between the Roundup Ready (RR) soybean resistant to glyphosate and direct sowing resulted in a technological convergence of high impact that contributed, since the mid 1990s, to expand soybean plantations into marginal zones, erasing rich areas of biological and cultural diversity (Pengue, 2005). Indeed, although the number of soybean plantations and the ensuing profitability have constantly increased since this seed introduction, it has reached new heights in Argentina since 1996 with the launching of transgenic soybeans, in particular, soybean RR. Different sources (SAGyP, FUNTALA, AACREA) show that between the 1998-99 and 2009-10 campaigns, soybean areas increased by 152,000 hectares; this represents more than 35% of the total cultivated area. It is assumed that the disappearance of linen crops, the marked

decrease in corn-planted areas, as well as the fast expansion of soybean caused the appearance of colza, brewer barley, and other crops, which almost allow the performance of the soybean in its early phase.

A relevant actor in this evolution has been the financial capital owned by companies with different social purposes and different economical activities, framed within the agribusiness model, with the aim to ensure higher returns on investment. Its renewed incursion into rural spaces, this time under the physiognomy of pools of crops and feedlots, has given rise to a strong agricultural growth, both horizontal (more cultivated areas) as well as vertical (more agricultural specialization), more animals per surface area, less time for fattening, greater supply resources and capital to achieve scale economies. As Posada et al. (1996) sum it up: “[...] investment funds, managed by firms created *ad hoc* and constituted by non-agricultural investors, who aim at controlling more than 40,000 hectares in a single campaign.”

Figure 4 Image 1 shows that the livestock activity in 1988 (represented in black and gray) covered an important rural area in Tandil. However, in recent years the new crops expansion reduced the area destined to livestock and the competition induced the displacement of the dairy- and meat-livestock as well as intensification methods. The analysis of both satellite images (Figure 4) reveals this situation. By comparing the images, it is blatant that crop areas in red and deep pink significantly progressed at the expense of livestock areas (in black or gray), historically located in the northeast, in the lowest part of the district. Besides, according to the observation the agricultural expansion has been encouraged over the entire



**Figure 3:** Crop-planted area in Tandil, Argentina, between 1990 and 2009. Based on data from the Ministry of Agricultural affairs (2009), [www.maa.gba.gov.ar](http://www.maa.gba.gov.ar) (consulted 2013).

**Table I**

Changes in the structure of farms in Tandil, Argentina, 1988-2002

Census		Total	Expansion of farms (ha)			
			< 200	200-500	500-1,000	> 1,000
1988	Farms	1,095	619	203	154	119
	ha	477,023	48,890	66,309	111,031	249,792
2002	Farms	659	270	147	101	141
	ha	442,390	22,840	47,693	73,612	298,243

Based on data from the National Agricultural Census (1988 and 2002)



**Figure 4:** Both images correspond to the last agricultural censuses (1988–2008) in Tandil, Argentina. They were obtained by satellite Landsat 5 and belong to bands 3, 4 and 5. They were treated with ArGis 9.3 and Raster composite band, where the images were entered in the order 4, 3 and 5 so as to obtain the predominant vegetation cover (in red).

area, reaching today beyond the more marginal areas of the north-east and hill slopes (Figure 5).

The beginning of the year 2000 was marked by a socioeconomic and political crisis, and by the suppression of the convertibility system and a devaluation. These measures indirectly accelerated the soy-bean territorial expansion on the agricultural border and displaced the systems of livestock production. The Fundación Tandil Libre de Aftosa (FUNTALA), an organization in charge of the vaccination against foot-and-mouth disease, reports that extensive meat-livestock units have been receding in Tandil since 1995. Table II also shows that, since 2004, the main local growth was the fattening activity in feedlots, with a high investment in intensification. The loss of surface area and the decrease in livestock-meat production units (Figure 6) intensified pasture destruction and feedlot development. These were

identified as holdings dedicated to the intensive fattening of the owners’ animals as well as others’, offering a hotel-type charged service. The substitution of the traditional pasture type by stabled production or feedlots has induced an increase in the number of animals per surface unit (Barsky and Dávila, 2008). This strategy has maintained livestock in Tandil in the last years and it represents an alternative to agricultural expansion.

Intensive management had been prompted by the compensating policies implemented by the National Agriculture Department between 2007 and 2010, which subsidized the installation

**Table II**

Number of cattle head in Tandil, Argentina

Year	Num. of head
1995	357,572
1996	345,256
1997	300,914
1998	–
1999	312,044
2001	349,009
2002	345,898
2003	338,740
2004	361,270
2005	387,560
2006	349,057
2007	343,927
2008	338,538
2009	332,610

Based on data from CO.PRO.SA-FUNTALA

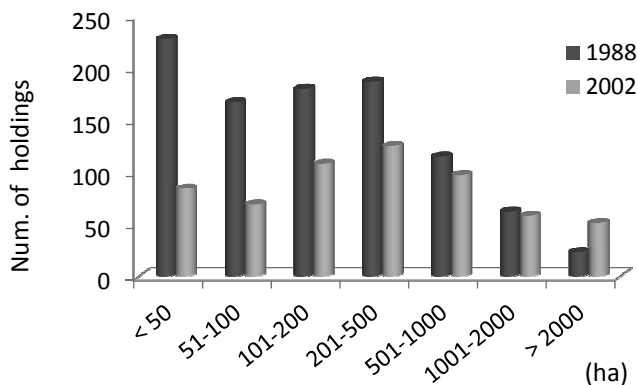


**Figure 5:** Delocalization of the meat-livestock production systems in Tandil, Argentina.

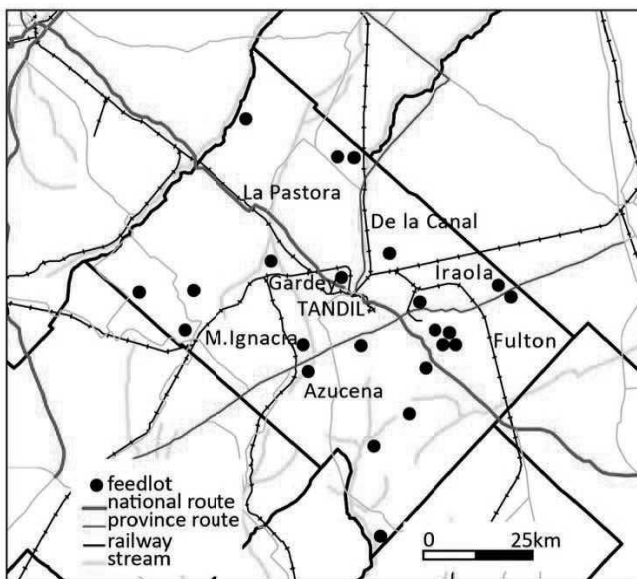
of feedlots to boost the internal market supply. As a consequence, 27,120 bovine head were registered in Tandil, which thus ranked among the first fifteen departments at national level, with more than 10,000 bovine head distributed in 23 establishments (Figure 7).

Along with new national and provincial regulations, bylaws at municipality level have been adopted. In Tandil since January 2009, a municipal bylaw (No 11,317) specifies environmental requirements addressed to the holdings specializing in intensive livestock breeding in feedlots: "In order to be authorized to settle and manage them, companies must submit an environmental impact assessment to the Environmental Department."

The system of dairy-livestock production has not been spared from the changes. Mar y Sierras dairy basin consists of different districts<sup>4</sup> and Tandil ranks first as a fluid-milk producer. Some of the transformations in the dairy production systems have been associated with: i) the increase in production scales, the consolidation



**Figure 6:** Variations in sizes of livestock farms in Tandil, Argentina, in 1988–2002, based on data from CO.PRO.SA-FUNTALA.



**Figure 7:** Feedlots in Tandil, Argentina, in 2009. Source: Local Development Department, Municipality of Tandil, 2009, based on data from CO.PRO.SA-FUNTALA.

of medium-size fluid-milk units, with business logic and risk management; ii) the disappearance of small producers; and iii) the displacement of the remaining ones to marginal or poor-soil-quality areas. The result has been the disappearance of the familiar dairy units. According to the Provincial Program of Milk Policies of the Ministry of Agricultural Affairs, between 1970 and 2010, the number of fluid-milk units decreased from more than 400 to 89 (Figure 8). Their disappearance was caused by: i) their small size, ii) their far location from transport and communication networks, iii) the non-incorporation of genetic and technical innovation, and iv) their conversion to soybean crop and/or land rental.

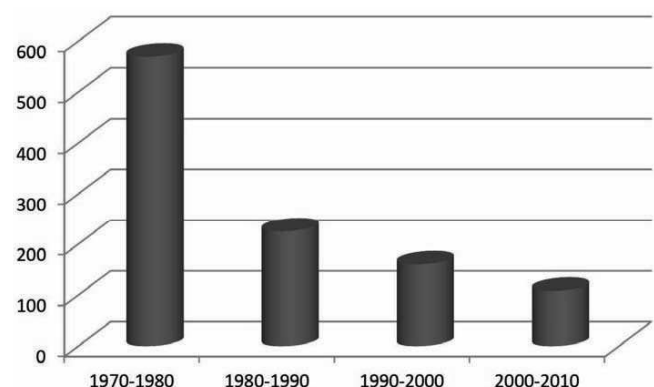
In this transformation process, among the fluid-milk production units 55% were highly efficient, achieved profits and integrated cooperative forms of production with access to marketing, 23% were small and did not operate according to sanitary standards and tax regulations, and 22% invested in fixed capital.

The rural spaces analyzed are structured around enclaves of productivity and growth linked to i) intensive agricultural methods and financial means, ii) an increasing economic competitiveness supported by comparative advantages, making the systems of capital-intensive production artificial, iii) a high increase in socioenvironmental conflicts, and iv) the absence of territorial-planning policies. These spaces are rebuilding their images through the definition of their scenarios and challenges; it is thus appropriate to refer to them as rural territories in critical adaptation mutation. In these scenarios the fragility-revitalization tension acquires diverse forms of territorial resolution. They all contribute to form a territory or, according to Méndez (2005), a "dual territory" in which the contradictions associated to innovation are emphasized.

When agricultural profitability increased and the opportunities of investments in other sectors of the economy became less attractive, the non-agricultural and transnational financial capital turned to agricultural production chains. These investments were allocated through pools of crops and feedlots, which then began controlling the crop-livestock systems.

The scientific literature reports that business producers and families were displaced by the production homogenization process because of: i) the increasing need of financial capital to reach a competitive scale, ii) the incorporation of technological and agrochemical innovation, iii) the increase in rental prices, iv) the need for new knowledge for a 'profitable' action, and v) the pressure of external actors, supplies, and capital.

The soybean system, skeleton of the pools, is complex and imprecise. Big international companies of agrochemicals and



**Figure 8:** Evolution in the number of fluid-milk producing farms in Tandil, Argentina. Based on data from the Ministry of Agriculture, [www.minagri.gob.ar](http://www.minagri.gob.ar) (consulted in 2012).

4. <http://competitividadprospas.net/competitividad/quieserotandil>

seeds – signs of cereal exportation –, national and international financial capitals, and big agricultural producers are intertwined, making the limits between actors and territories unclear. Thus, a network system has been developed by owners, production contractors, services (e.g. Agropack) (knowledge and assessment). Agricultural enterprises associate non-agricultural actors who want to make their savings profitable.

Labor reduction is not the only consequence. The expansion of a single crop (soybean) and the development of feedlots impact on environmental sustainability. They cause land deterioration and erosion, loss of soil fertility and land structure, salinization, alkalization, crust, loss of biodiversity, floods, and they impact on aquifer strata.

Among the interviewees, an agricultural producer made a key remark that encompassed the changes that have been occurring in rural spaces: "They have impacts all along the price chain, as the activities displaced are necessarily carried out in less adapted lands, generating higher costs, which result in a significant increase in the final market price. Hence, the pools of crops, not being land owners, ultimately become land users and gain control over the production process."

## ■ CONCLUSION

The expansion of the soybean transgenic crop and the adoption of state-of-the-art agrochemical packs drastically transformed the structure of actors and the different management of production units. Their local impacts are so broad and deep that a new complex and contradictory picture emerges, characterized by the deterioration or breaking away from the production networks in place.

In this context, the relationship between society and nature is constrained by the process of production organization at global-local level. For instance, a seed variety has genetic characteristics that lead its development, but its yield and productivity levels will depend on the way the productive-technological process is organized according to the differences between the spaces, as stated by Silveira (2004): "The space is not a fragment, but just the reality in movement, which is affirmed and denied through the event, modeling a subspace in the global space".

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## Résumé

**Nogar M.L., Nogar A.G., Jacinto G., Carrizo S.** Changements dans les méthodes de production dans la région de Tandil en Argentine

Les transformations territoriales de la pampa sont centrées sur les changements dans l'utilisation des terres rurales, marqués par le déclin de l'élevage et le remplacement fréquent des cultures traditionnelles par la culture de soja. La compétition avec les cultures a obligé les fermes à se déplacer et la production extensive a été remplacée par des systèmes intensifs, en relation avec l'émergence de nouveaux acteurs. L'intégration de la technologie dans l'agriculture a provoqué des transformations socio-territoriales qui ont restructuré les espaces ruraux. L'article montre les scénarios de changement dans l'utilisation des terres rurales de Tandil, par des enquêtes centrées sur la progression de l'intensification de la production (soja, *pools* de semences, lots d'engraissement) et ses résultats : la détérioration des ressources naturelles, le déplacement des systèmes de production, principalement le bétail, l'hégémonie de la monoculture et l'expulsion des acteurs ruraux. Le cadre théorique est basé sur l'analyse des zones rurales, construites à partir des liens ruraux-urbains, pour comprendre ces changements et interpréter les scénarios futurs. Dans la méthodologie, nous avons mené des entretiens non structurés pour relever des données quantitatives et qualitatives, et nous avons comparé les images satellite des données de recensements (1988 et 2008). En conséquence, lorsque la rentabilité agricole et le nombre de plantations de soja étaient très élevés, les opportunités d'investissement dans d'autres secteurs économiques étaient moindres. Le capital financier, non agricole et transnational a ainsi progressé le long de la chaîne de production. Ces investissements ont été apportés par le biais de *pools* de semences et de lots d'engraissement qui contrôlent aujourd'hui les systèmes de culture et d'élevage. Les nouveaux acteurs, puissances et hiérarchies qui s'entrecroisent se sont positionnés le long de la chaîne de production locale, également mondialisée dans le temps et dans l'espace.

**Mots-clés:** bétail, système d'exploitation agricole, soja, monoculture, changement social, dégradation des terres, Argentine

## Resumen

**Nogar M.L., Nogar A.G., Jacinto G., Carrizo S.** Cambios en los métodos de producción en la zona de Tandil en Argentina

Las transformaciones territoriales pampeanas se focalizan en los cambios en el uso del suelo rural, marcados por el repliegue de la ganadería, la sustitución de importancia relativa de los cultivos y la sojización. La competencia con la agricultura provocó cambios de localización de la ganadería y sustitución de la producción extensiva por sistemas intensivos y asociados a la emergencia de nuevos actores. La incorporación de tecnología en la agricultura provocó transformaciones socio-territoriales, que reestructuran los espacios rurales. El artículo muestra el escenario de cambios en los usos de suelo rural de Tandil, a través de indagaciones centradas en el avance de la intensificación productiva de las acciones (sojización, *pools* de siembra, feed lots) y sus resultantes: deterioro de los recursos naturales, desplazamientos de sistemas productivos, principalmente ganadero, hegemonía del monocultivo y expulsión de actores rurales. El andamiaje teórico parte del análisis de los espacios rurales, construidos desde los vínculos urbano-rurales, para comprender los cambios e interpretar los escenarios futuros. En la metodología se registraron datos cuantitativos y cualitativos, a través de entrevistas no estructuradas, y se compararon las imágenes satelitales de datos censales (1988 y 2008). Como resultados, cuando la rentabilidad agrícola y la siembra de soja se hicieron altamente positivas, las oportunidades de inversión en otros sectores económicos fueron menos atractivos; los capitales financieros, extraagrarios y transnacionales avanzaron hacia las cadenas de producción. Estas inversiones se canalizaron a través de *pools* de siembra y de feed lots, que pasaron a controlar los sistemas agroganaderos. Los nuevos entrecruzamientos de funciones, jerarquías y poderes encontraron referentes dentro de la cadena productiva localizada, simultáneamente temporal y espacialmente mundializada.

**Palabras clave:** ganado, sistema de explotación, soja, monocultivo, cambio social, degradación de tierras, Argentina