Egyptian J. Anim. Prod., (2007) 44(2):205-212

IMPACT OF RESEARCH STATIONS ON TECHNOLOGY TRANSFER IN THE CROP LIVESTOCK PRODUCTION SYSTEM

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SUMMARY

The present study was carried out to measure the impact of research stations, as an agency for technology transfer, on crop/livestock production system in surrounding areas. Four clusters of farmers were aggregated in two research stations which belong to APRI (Sakha, S1 representing the Delta and Seds, S2 representing Upper Egypt). Within each station two sub clusters were composed of 30 farmers each; one for farmers who never received any service from the station (G1), the second for beneficiaries of the station (G2). The data collection took place between June and September 2005 using semi-structured questionnaire. For measuring the impact of the research stations, two different approaches were adopted. The first measured satisfaction of farmers towards performance of station while the second compared performance indicators of the production system for G1 and G2. Data were analyzed using the linear model procedure of SAS (1999).

Results obtained indicated indispensable role for research stations in the transfer of technology to small farmers under the crop/livestock production system. Beneficiaries (G2) adopted more innovative technologies and achieved higher gross margin. Sakha station (S1) exerted more clear impact on the adoption of technology and economical performance than did Seds station (S2).

Keywords: Research stations, impact, production system, technology transfer, Egypt

INTRODUCTION

Technology transfer process is formulated by a triangular composed of three basic lines. These are research, extension and farmer (Rogers, 1995). If any of the three mentioned parties is missing, technology transfer process can not be successfully completed. The three components present a loop in which the farmer is playing both the starting and the ending point of the cycle.

Research stations represent a potentially effective agent for the process of the technology transfer. On one hand, a research station presents an extension of the research center maintaining all strong institutional links with the scientific works produced by the researchers. On the other hand, the geographical localization of a research station, being situated in the heart of the rural areas, suggests strong mutual relationships with the farms.

It is essential when talking about technology transfer to bear in mind the central role the Farming Systems Research (FSR) expected to play in organizing the entire process of the transfer. In this context, Schiere *et al*. (2000) concluded that the FSR provides methodologies and concepts that bridge the gap between formal commodity research, including crop residues and by-products, and field application.

The present study was designed to answer the question: can the research station be used effectively as an extension organization, in addition to its research role. The main objective was to study the impact of two research stations, namely, Sakha and Seds, on the mixed crop livestock system prevailing in the surrounding areas. Among eight innovations that were evaluated in a more comprehensive way; artificial insemination (AI) was selected to be displayed as a model for the detailed evaluation.

MATERIAL AND METHODS

Data collection for the current investigation was carried out in areas of two major research stations belong to the Animal Production Research Institute (APRI), Ministry of Agriculture and Land Reclamation, Egypt. The first station represented the Delta region (Sakha station, S1) located 155 km to the north of Cairo. The second station represented Upper (Southern) Egypt (Seds station, S2) located 120 km to the south of Cairo.

Within each station, two groups of farmers were interviewed using semi-structured questionnaire. Group 1 (G1) included farmers who have never received any kind of service from the research station. Group 2 (G2) included those who dealt with the corresponding station in their area for one time at least. A 2*2 design with equal subclass numbers was used as shown in table 1.

Table 1. Distribution of interviewed farmers by station and group

Research Station	Non-beneficiaries (G1)	Beneficiaries (G2)
Sakha (S1)	30	30
Seds (S2)	30	30
Total	60	60

Traits studied included two major categories to measure the impact of research station on the production system. The first, "farmers' opinions" included: evaluation of the station's role and evaluation of technological innovations. The second category expressed the farm budget that was compared for G1 (baseline) and G2 (beneficiaries) to assess the impact of research station on the mixed crop/livestock production system.

In total, 32 innovations were studied. These were categorized under four main categories. The first was animal nutrition enhancement innovations. The second category was milk hygiene while the third category was milk processing. The fourth category was improved farm management and composed of: records and recording, reproduction agenda, AI, improved housing, hoof trimming and farm planning.

The data were analyzed by the linear model procedure of SAS (1999). The following fixed-effects linear model was applied for the statistical analysis:

$\mathbf{Y_{ijk} = \mu + S_i + G_j + (SG)_{ij} + e_{ijk}}$ where:

Y_{ijk} is the observation; μ is the general mean, S_i is the effect due to i^{th} station, i= 1, 2. G_j is the effect due to the j^{th} group, j=1, 2. $(SG)_{ij}$ is the effect due to the interaction of station and group and e_{ijk} is a random effect associated with the individual observation.

RESULTS AND DISCUSSION

Farmers' opinion

Evaluation of station role

Figure 1 presents the farmers' feedback about the general role of the stations in their areas. Three categories were offered for the farmers to choose from. These were "Indispensable" that matches with top rank of satisfaction about the station role, "Important" that refers to a significant role of the station but still there is a need for further improvements and "Not important" that expresses minimum degree of appreciation for role of station. Majority of Sakha farmers (93%) indicated the indispensable role of station in their area. On the other hand, Seds station farmers put more emphasis (80%) on the need for further improvement for their station by selecting the middle category in the questionnaire "Important but still needs further improvements".

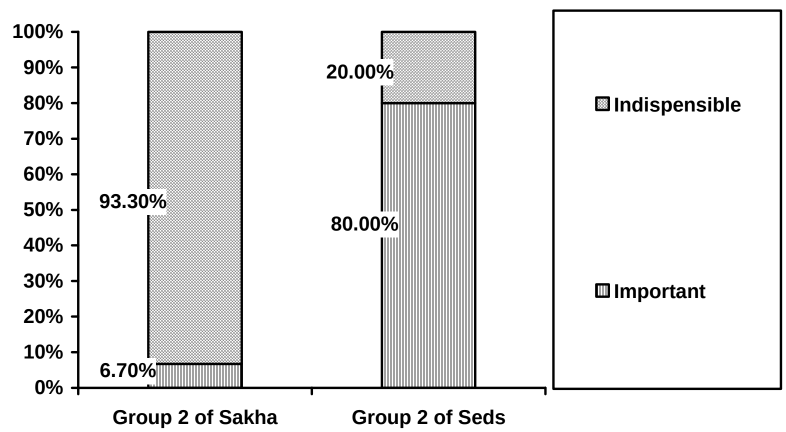


Figure 1. Farmers' opinion about their corresponding stations

Evaluation of innovations

General evaluation

Evaluation of 32 innovations under four categories: enhancement of animal nutrition, milk hygiene, milk processing and improved farm management is presented in Table 2. Three different classes that express state of adoption of the diffused innovations are presented. Class "Still Applying" that the farmer at the time of making the survey was still adopting the innovation. The class "Never Applied" refers to a case where the farmer has never adopted the innovation. The class "Quitters" refers to a situation where the farmer started adopting the innovation but the performance of the innovation was not as it was expected, as a result the farmer eventually decided to give up the adoption of the innovation.

This survey was not performed only for station beneficiaries (G2) but also for non-beneficiaries (G1). The reason behind eligibility of G1 farmers for this survey is that the station is not always the only source of awareness about some innovations.

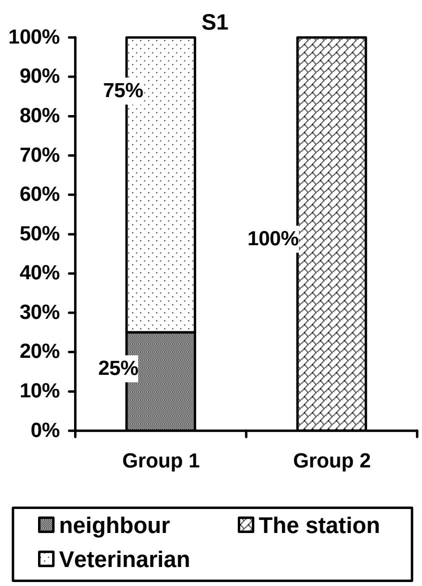
Table 2. General evaluation of innovation adoption

	Group 1			**Group 2**		
	Still applying	**Never applied**	**Quitters**	**Still applying**	**Never applied**	**Quitters**
Sakha	12.0%	88.0%	0.0%	65.4%	27.3%	7.3%
Seds	23.2%	76.6%	0.2%	33.2%	40.0%	26.8%

The impact of station in supporting the technology transfer process for the proven innovations is remarkable. Within S1 station, the differences between G1 and G2 are more obvious than that within S2. This finding simply reflects greater impact of S1 than S2 station on the transfer of the new innovations. On the average, beneficiary farmers of Sakha started to deal with the station about eleven years earlier than farmers of Seds. This difference was large enough to declare significant ($p < 0.0001$) differences between both stations in supporting technology transfer. Although the used statistical model was assuming that main effects are subjected to station, site and interaction between both; other factors contributing to the variance are added to the residual.

Detailed evaluation of innovations

Figure 2 shows the importance of the station as a source of awareness about AI.



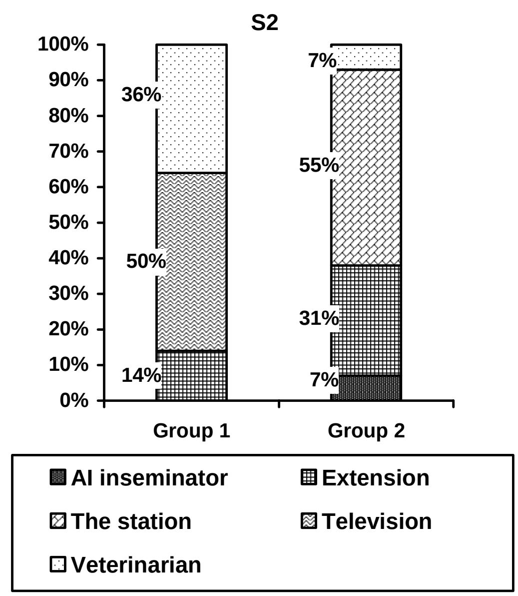


Figure 2. Sources of awareness about AI

Sakha station was the only source of awareness for the beneficiaries (G2) in its area about AI innovation. However, the veterinarian was proven to be a very powerful source (75%) of information in case of G1 of S1. For S2, five sources of information about AI were demonstrated. The S2 share out of the five was 55% of the G2 farmers being informed about AI innovation by the station. The televised extension programs were the most important source of information for the non-station farmers (G1) of S2.

Farmers who have already adopted the AI innovation were asked to categorize the role of the station in their area for the success of the adoption. Appreciation degree in case of S1 farmers was higher than that for S2 farmers. About 84% of S1 farmers believed that without the station support they would not have adopted the new technology. However, in case of S2, 60% of farmers described the role of their station in encouraging the adoption as supportive rather than essential (Figure 3).

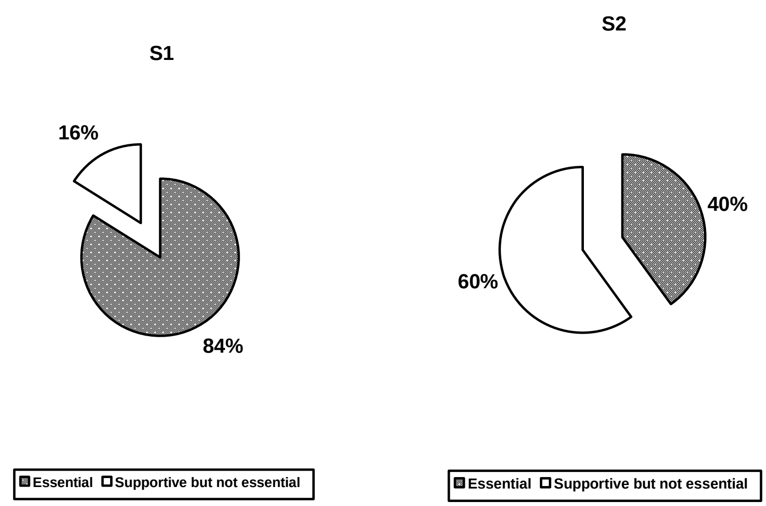


Figure 3. AI-adopted farmers' evaluation for the station role

Farmers who never adopted AI were interviewed to find out main obstacles against the adoption. Three major types of answers were recorded: "Worry about dystocia", "Trust natural more", and "Unavailability of inseminator". Figure 4 illustrates reasons behind although aware never applied AI.

In the current investigation none of the AI never-applied-farmers belonging to Group 2 either within S1 or S2 has rejected the innovation due to lack of knowledge about it. This reflects effective efforts of both stations in approaching the farmers but yet the infrastructure to provide the service was not supportive enough.

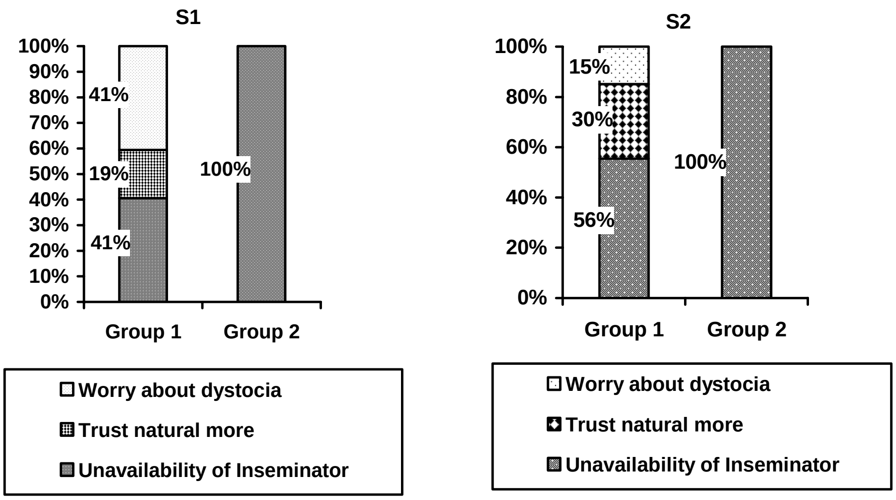


Figure 4. Reasons behind although-aware-never-applied AI

Farm budget

Table (3) shows farm budget calculated for both crop and animal production. Similar trend with less values were observed by Tabana *et al*. (2000), El-Wardani *et al*. (2003); El-Sayes and El-Wardani (2004) and Rashwan (2006). The differences in values are mainly attributed to the inflation rate that occurred in the period between time of current investigation and other times of the mentioned references.

Table 3. Farm budget

Parameter	Station	Group 1	Group 2	Overall average
Farm revenues (LE)	S1	48,949^{c}±1,928	86,245^{a}±2,805	67,597^{A}±2,957
	S2	40,034^{d}±2,230	65,372^{b}±3,141	52,704^{B}±2,523
Overall average		44,492^{B}±1,573	75,809^{A}±2,491	
Variable costs (LE)	S1	28,731^{c}±1,284	57,542^{a}±3,054	43,137^{A}±2,493
	S2	21,681^{d}±1,044	44,125^{b}±2,104	32,903^{B}±1,868
Overall average		25,207^{B}±940	50,834^{A}±2,036	
Gross margin (LE)	S1	20,217^{b}±1,361	28,702^{a}±1,548	24,460^{A}±1.162
	S2	18,352^{b}±1,686	21,248^{b}±1,931	19,800^{B}±1,285
Overall average		19,285^{B}±1,081	24,975^{A}±1,320	

Within each raw and within each column, means followed by different letters differ significantly ($P< 0.05$) using Duncan multiple range test (Duncan, 1955).

The difference between S1 and S2 in farm revenues is obvious. The increase of S1 over S2 has reached about 28%. The gap in farm revenues between both Groups was even higher,. percentage of increase of G2 over G1 reached 70%. This is due to combined effect of site and station.

A similar trend was observed in case of the variable costs. Again, the gap between the Group 1 and Group 2 is much higher than that between S1 and S2. This indicates significant impact of the station over both farm revenues and expenses.

Significant differences in gross margin existed between both stations and between both groups. The interaction between the station and the group was not significant for variable costs and gross margin (P=0.1197 and P=0.0920, respectively). However, within the stations, the impact of G2 in increasing gross margin was big enough to be significant. However, the difference between Group 2 and Group 1 within S2 station was not significant. This indicates much stronger impact of S1 station over its area rather than that of S2 station. This can be explained considering the more development achieved in the Delta region where S1 is situated in comparison with Upper Egypt where S2 is placed. One more reason to make S1 of higher impact than S2 is the concentrated activities of the EU development project "Food Sector Development Program" (FSDP). This project had rather big influence on the institutional capacities building, infrastructure and human resource development in S1 station.

REFERENCES

Aboul-Ela, M.B., 1993. Oestrous detection and reproductive management of buffaloes raised in small holdings in Egypt: A survey study. Proceedings of International Symposium on **“**Prospects of buffalo production in the Mediterranean and the Middle East., EAAP Publication No. 62, Pudoc Wageningen, The Netherlands, pp.381-384.

Bernard, C.S. and J.S. Nix, 1993. Farm planning and control (2nd Ed.). Cambridge University Press, Cambridge.

Duncan, D.B., 1955. Multiple range and multiple F-tests, Biometrics, 11, pp. 1-42.

El-Sayes M.F. and M.A.A. El-Wardani, 2004. Dairy farm characteristics under mixed faring system in Ismailia governorate in Egypt. Egyptian Journal of Animal Production, Vol.41, Suppl. Issue, Nov.93-102.

El-Wardani, M.A., T.H. Shalaby and F.E. El-Keraby, 2003. Herd dynamics of medium scale dairy farms under mixed farming system in the Nile delta region. Proceeding of the 6th International Livestock Farming System Symposium Livestock Farming Systems/Product quality bases on local resources and its potential contribution to improved sustainability, 26-29 August, Benevento, Italy.

Rashwan, Reham, M., 2006. Evaluation of Some Local Milk Production Systems, M.Sc. thesis, Dept of Animal Production, Faculty of Agriculture, Ain Shams University, Egypt.

Rogers, E. M., 1995. *Diffusion of Innovations. Fourth edition.* The Free Press. A division of Macmillan Publishing Co., Inc, New York.

SAS. 1998. SAS/STAT User's Guide, Release 6.03 Edition. SAS Institute Inc. Cary, North Carolina, USA.

Schiere J.B., K. Singh, A.J. De Boer, 2000. Farming systems research applied in a project on feeding of crop residues in India.. Experimental agriculture. Exp. agric. Jan 2000. v. 36 (1) pp. 51-62.

Tabana, A., H. Van Keulen, S. Tamminga and I. Gomaa, 2000. Development of decision support system for individual dairy farms in mixed irrigated farming systems in the Nile delta. Ph.D. Theses, Wageningen University, Wageningen, The Netherlands.

تأثير محطات البحوث على نقل التكنولوجيا فى نظام الإنتاج النباتى الحيوانى المختلط

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إستهدفت الدراسة قياس تأثير محطات البحوث كوسيط لنقل التكنولوجيا – على نظام الإنتاج النباتى الحيوانى المختلط فى المناطق المحيطة. تم تكوين أربع مجموعات من المزارعين (كل مجموعة تشمل 30 مزارعاً) فى المناطق المحيطه بمحطتين للبحوث ، سخا التى تمثل إقليم الدلتا ، وسدس التى تمثل منطقة مصر العليا. داخل كل منطقة تكونت مجموعتان الأولى تمثل المزارعين الذين لم يسبق لهم التعامل مع المحطه ، والمجموعه الثانيه المستفيدين الذين تعاملوا مع المحطة مرة واحدة على الأقل. جمعت البيانات بإستخدام إستمارة إستبيان خلال الفترة من يونيو – سبتمبر عام 2005.

تم قياس تأثير المحطه بطريقتين: الأولى من خلال قياس رأى المزارعين فى أهمية دور المحطة فى مناطقهم ، والثانية بمقارنة الأداء الأقتصادى للمزارعين فى المجموعتين بإستخدام دليل هامش الربح.

أكدت نتائج الدراسة الدور الأساسى لمحطات البحوث فى نقل التكنولوجيا إلى المزارع الصغير فى نظام الإنتاج النباتى/ الحيوانى المختلط فى الدلتا ومصر العليا. حققت مزارع المستفيدين من المحطات معدلات أعلى فى هامش الربح. وكان لمحطة سخا تأثير أوضح من محطة سدس على معدلات التبنى للمبتكرات الحديثة والأداء الإقتصادى للمزرعة.