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The process of constructing new competencies in the family agricultural production unit

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Abstract. This article discusses the difficulties dairy farmers face when they decide to install a new type of production on their units. We intend to discuss the nature of the new competencies the farmers will construct in order to install new production ateliers, and to show the complexity of the means they used, the difficulties they face in this process, and the strategies farmers develop in consonance with the practical knowledge of their profession. The method used was Ergonomic Work Analysis, together with semi-structured interviews, done after sessions of observation and work analysis. The results show that it is possible to apprehend a part of the complexity of the process of constructing competencies among dairy farmers, the diversity of kinds of resources they mobilize, integrate and transfer in this construction process that materializes through their activities in the work context.

Key words: ATWAD, agricultural ergonomics, family farming, family agriculture, cognition, competencies

1. Introduction

This article discusses the difficulties faced by dairy farmers who decide to install a new kind of production on their units, for various reasons, outstanding among which the need to increase income from the production unit. We intend to discuss the nature of the new competencies the dairy farmers construct when they install new production ateliers, making evident the complexity of the means they use, the difficulties they face in the process, and the strategies they develop in consonance with the practical knowledge in their profession. To lay the foundation for analysis and discussion of the data presented, we use Jourdan's [1] approach along with Le Boterf's [2] [3] visions of the process of constructing competencies.

While studying the work of wine grape growers in France, Jourdan [1] stated that farmers' competencies in work situations consist of competencies in observation, synchronization and research. The observation competency leads farmers to determine the horizontal space-time of their activities, by establishing the relationship among different cultural practices (procedures done on the vineyard) and the horizontal time periods in which they take place. Synchronization competencies are essential for farmers to organize actions in a given time period. Research competencies, in turn, are defined by the author as the farmer using different procedures to resolve diverse kinds of problems [1]. These procedures constitute acts of research, experimentation and acceptance. Research procedures aim to find a plausible explanation or possible solution for a cultural problem. Experimentation procedures distinguish themselves from research because they are not inscribed in production activity and because they require cognitive cause-effect processes, while research procedures require cognitive processes of analogy, similarity, approximation/differentiation. Acceptance procedures determine the conditions for accepting practices and experiments and have to do with the search for satisfactory solutions, considering the set of producer objectives [1]. According to the author, farmers have the tendency to prioritize their experience over all other sources of knowledge and in order to make decisions, they need to make different sources of knowledge converge – those from techniques with which they have experience, specialized magazines, neighbors, etc. The author further says that technical

knowledge is just one element among others for the farmer's decision-making [1].

Yet Le Boterf [2] [3] considers that competency is performed in the action and that there is no competency existing outside the context of using this one – professional competency develops in practice. The author uses the concept of " resources" to describe the set of knowledge and know-how that is mobilized in constructing competencies, adding social know-how to resources: the repertory in knowledge and know-how which an individual has does not consist solely of theoretical or procedural knowledge that can be mobilized in a specific work situation; there also exists a social component formed by codes, social representations, values, statutes, the relationship attitudes adapted to the social prescriptions of a group or a particular culture [3].

Le Boterf [3] stresses that for a competency to exist, there has to be a process of resource mobilization, that is, the utilization and transformation of the repertory of resources that an individual has available for these resources to be able to accede to the *status* of competencies. This mobilization has a particularity; it is not simply application, but a construction. It is what the author calls know-mobilizing [3].

That is, competency only exists in action; it is always the competency of an actor in a situation. Competency emerges in action, it does not precede it. Competency is exercised in a particular context, it is contingent. All competencies are functional and contextualized [3].

Nonetheless, to achieve competency, it is not enough for the individual to know how to select resources from his/her repertory, those that are pertinent to a given situation. One must organize and use them to perform a professional activity, resolve a problem or carry out a project. When there is a problem to be resolved or a project to be carried out, one constructs a cognitive architecture specific to the competency. From a combining nature, the competency has several overlaying ingredients that will have to be selected with discernment. It is not a simple summation up pieces of knowledge. It is what Le Boterf [3] calls know-integrating – the competency is that ability to know how to integrate diverse, heterogeneous pieces of knowledge.

The author further stresses, with respect to know-integrating, that the coherence of the arrangement of the pertinent elements selected by the individual from among the available resources is not in function of a given situation, but rather of the representation that the operator constructs of the situation. The representations and cognitive style are not identical from one person to another [3].

Le Boterf [3] also introduces transfer-knowledge as one of the processes in constructing competencies. This in turn is related to the individual's ability to transfer the mobilization and integration of these resources to a new work situation, even when it retains some of the characteristics of the earlier-treated work situation. Know-transferring is then the capacity to generalize the constructed competency to a given shape of the work situation, where the individual is able to deal with it based on resources which have already been utilized while validating and adapting them to the new situation, which is similar, although distant, from the former. (Fig. 1)

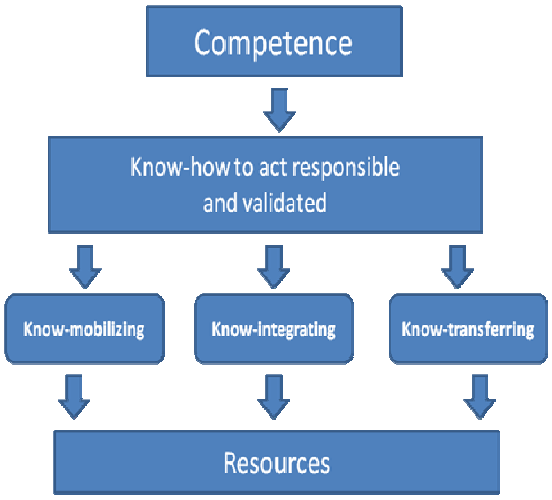

Figure 1 – Le Boterf's Competency Model

Consider, therefore, that the process of constructing competencies takes place through action, by means of mobilization, integration and transferring resources of a declarative and/or procedural nature into certain work situations. What is theory, behavior, transforms itself into competency by means of utilization and transformation of resources that an individual deploys when she/he puts them in action.

There remains one important question, related to the importance of the role of self-image in the construction of competencies. Le Boterf [3] states that mobilizing pertinent knowledge or know-how in a situation is not related just to cognitive resources, knowledge or know-how. Mobilizing resources presumes confidence that they exist, the capacity to use them in an effective way and in their potential for evolution. A negative self-image or a lack of confi-

dence can be the source of inhibition or incompetence [3]. When individuals face new situations, if they don't have confidence in their competency and are invaded by fear of being judged for unsatisfactory performance "they will tend to banalize the novelty of the situation, rely prematurely on already-known answers, and protect themselves by repeating what they already know how to do" [3, p. 71]. The self-image assume an important role in the case of any non-routine situation, allowing the individuals to have confidence in themselves as competent actors, leading them to explore their resources.

This social insertion of human activity is corroborated by Darré [4, p.11], when he says that "judgments about what is good or not to do, about the way of recognizing oneself in certain situations, of describing it, of evaluating it, even when they are individuals, are nonetheless shaped by the social and cultural means of conceiving of things."

In the case of farm work activity, which is carried out in dynamic environments, rich in unforeseen occurrences, these non-routine situations are very frequent [5] [6]. A positive self-image is a prerequisite for constructing competencies in the farming profession.

2. Methods

The data presented here originated in an ergonomic intervention at ten family dairy farm units which produce cow's milk in the department of Mayenne in western France. Action-training in the organization of work on the family units, consisted of seven training sessions with the group of ten dairy farmers, and ten sessions of observation and work analysis, at each of the ten production units. Discussions of the action-training sessions centered on important events that occurred during the observation and work analysis sessions.

The method used in observing and analyzing sessions was Ergonomic Work Analysis [7]. At the end of each session there was a process of co-construction involving ergonomist and farmers. There was produced an Action Chronicle representing the work done during the observation and work analysis session, as well as a Plan of Utilization for the Installations [5] [6].

The data selected for the presentation and discussions in this article are especially related to one of the ten production units where we carried out the study. This unit was chosen due to the history of the dairy farming couple who traditionally produced cow's milk, but who decided to begin a new atelier to produce goat's milk, in order to increase family income and thus its welfare.

The data are qualitative, coming from semi-structured interviews, tape recorded and later transcribed and analyzed, done after the session of observations and work analysis [5] at the cited production unit. The objective of the interview was to recover the history of installing this new goat milk production atelier alongside the main production of cow's milk. The present article contains an *a posteriori* reflection about this information.

3. Results

The couple produced cow's milk on the family production unit, but needed to increase income from the unit in order to improve the family's comfort. The couple decided to create a goat milk production atelier, since at the time the dairy cooperative in the region was looking for dairy farmers to initiate this type of production. They decided to begin production with thirty goats. They already had experience in producing cow's milk, which would help in goat milk production. They realized that in practice they would need another kind of competence for this new type of production. It was through a process of mobilizing their knowledge set and know-how related to producing cow's milk, and integrating and transferring it to the new situation of "goat milk production" that they constructed this new competency.

At the beginning of this activity, the technicians (the cooperative veterinarians) told the dairy farmers that they should not use the same drugs they used with cows. They would have to buy goat-specific drugs which were more expensive than those for cows. So the farmers bought these goat-specific drugs, used them and discovered that they didn't work well. According to their reports, they weren't able to cure a single goat by using them. In addition, they discovered that, contrary to what the technicians who lent technical assistance had said, a goat can have post-partum milk fever (a condition related to calcium deficiency [1]) , similar to milk fever in cows. The dairy farmer realized that unlike cows that shows symptoms of milk fever, goats are capable of getting up before dying, which can mask their symptoms.

[1] http://www.cnpgl.embrapa.br/nova/publicacoes/comunicado/COT49.pdf

By applying the same drug used for cows in this case – however in lower doses – they managed to save two of three goats with this condition. This was very important to the success of the new venture of goat raising, since losing just one of the three breeders in a total of thirty had a considerable impact and would have serious consequences at the beginning of production, placing the viability of the new undertaking at risk.

By analyzing this situation, it can be understood how dairy farmers mobilized, integrated and transferred resources available for milk fever, despite:

- The differences between cow behavior vs. goats;
- The difference in pattern between the two breeds of animal;
- Going against what the technician experts recommended.

This example corroborates Jourdan's [1] statements about dairy farmers constructing their competencies based on experimentation. Another aspect treated by Jourdan [1] also appears in this example: farmers prioritize information coming from their own experience over that from other sources, in this case, the technicians' recommendations.

At the same family production unit, one could witness the creation and implementation of strategies to increase the reliability of the system. This refers to the system for goat identification, created to reduce the risk of milking them when not appropriate. This happened when the goats are on the verge of delivering their kids, or when they have already delivered and the milk needs to be separated. This separation is required as a prophylactic measure since there is a disease transmitted through the colostrum[2], caprine encephalitis arthritis[3]. Thus, to avoid contaminating the rest of the milk deposited in the tank, which would invite penalties for quality and thus in terms of income, this milk needs to be separated from the rest and rejected. The dairy farmer associates the identification system, done with cords tied to goat hoofs, with another with temporary ink marks on the animal's back. These identification systems are utilized simultaneously for different, though complementary, purposes, and constitute a knowledge set that allows the farmer to have confidence in his/her activity with the herd. Thus she/he reduces the risk of incorrect interventions, thus increasing the reliability of their work system.

[2] Colostrum is the first liquid emitted by the mammary glands after delivery.

[3] http://www.vallee.com.br/doencas.php/5/7

At this point, it is necessary to describe the goat identification systems: first the cord on the hoof system, and then, the system of temporary ink marks. The goats do not have an easy-going temperament – differently from cows, they eat everything you put in front of them. After trying to think up a system resistant to their "voracious appetites", the dairy farmers opted for tying a cord around one of the goat's hoofs, a solution that in addition to being able to resist their bad habits was relatively economical.

This practice is an adaptation of the commonly used system for marking cows in the region. Farmers fasten a red ribbon onto the cow's hoof with velcro to identify those to be milked separately. Thus the cord system for goats is an adaptation of the cows' red string, but these are tied with a more resistant knot (it would be impossible to use velcro). In the milking room, farmers can identify the goats who need to be milked separately due to having recently delivered kids, and keep from mixing their milk with the rest and contaminating it. They also use it to identify goats who won't get milked because they have yet to deliver their kids.

The temporary marking system using ink marks on the animals' backs, in turn, is used to identify animals the farmers shouldn't milk. Goats who stopped giving milk during pregnancy (not all) can lose the habit of going to the milking room. Thus when they do deliver, the farmer marks them with ink to make it easy to see in the stable those who are not heading for the milking room and can herd them there along with the others at milking time.

In practice the situation is a little more complicated: the use of a combination of systems depends on three variables the farmer observes:

- The goat's behavior – goats who dry up during pregnancy and lose the habit of going to the milking room, are identified by the temporary marks on their backs after delivery so that farmers don't "forget" them in the corral and can re-habituate them to being milked twice a day.
- The priority points for collecting information on animals in line with the task the farmer is carrying out – temporary marking on animal backs, is used especially to identify animals who have delivered and need to retrain the habit of going into the milking room. Farmers herd the goats into a waiting room and if they take a position a bit higher than the goats can see the marks on their backs with more reliability than the strings on their hoofs. When they are in the milking room work is closer to the level of their bellies and the string is more

easily seen from tit level when they set the milking machines.

- The appearance of the goat tits: when goats dry up during pregnancy, their tits wither. When it is close to the delivery date, their tits become tumescent again. When the tits on the goats who have not yet delivered begin to swell, the famer puts a cord on the hoof and after delivery, the goat will get the temporary mark on her back. Thus, when the milking room worker sees that the hoof string, s/he looks on her back. The goat will not be milked without the mark, since she has not yet delivered, and has to be observed since the delivery date is getting close, and delivery intervention might be needed. If the goat has a string as well as the back mark, the farmer knows that she has delivered and her milk needs to be separated. At the end of the period during which the milk is no good for commercialization, which last 3 to 4 days *post-partum*, the farmer removes the string and begins to milk the goat normally. This goat will retain the temporary mark for 3 to 4 weeks, since the lack mark serves to remind the farmer not to "forget" here in the corral and to shepherd her along until she relearns the habit of going to the milking room twice a day along with the others. .

Through this analysis it was possible to learn part of the complex process of constructing competencies among the farmers, the diversity of the kind of resources that they mobilize, integrate and transfer during the process of construction that materializes in their work activities. The dairy farmers use their available competencies regarding milk cows and adapt their knowledge to the new goat milking situations. They alter their resources based on the observation of complex variables, such as the behavior of different animal species, their physiological cycles, the cost and efficiency of the reference systems for their work activity, identification of different animals in the herd, and the appearance of certain animal body parts.

4. Conclusion

The results show the complexity of the process of dairy farmers constructing new competencies when installing new production workshops in a family dairy farming production unit. There is no competency outside the context of using it – professional competence develops in work practice [2]. This process is a construction and involves competencies in observation, synchronization and research [1] as well as know-mobilizing, know-integrating, know-transferring, at the same time considering the social component formed by the codes, the social representation, the values, the statutes, and the relationship attitudes adapted to the social prescription of a group or a particular culture [3]. This process is therefore, complex and can be associated to the risk of failure of the new production atelier, in case the dairy farmer couldn't manage to carry out the project efficiently

And in the case of technical assistance provided by the production cooperative, it demonstrated the fragility of the means available to help dairy farmers in the process of constructing new competencies.

References

[1] Jourdan, M. *Développement technique dans l'exploitation agricole et compétence de l'agriculteur.* 1989. 167f. Dissertation (Doctorate in Ergonomics) - CNAM, Paris.

[2] Le Boterf, G. *Construire les compétences individuelles et collectives.* La compétence n'est plus ce qu'elle était. 3ème ed. Paris: Ed. D'Organisation, 2004.

[3] Le Boterf, G. *De la compétence:* essai sur un attracteur étrange. 4 ed. Paris, Les Éditions d'Organisation, 1995. 176p.

[4] Darré, J.P. Le rôle des groupes de voisinage dans l'élaboration et la reproduction des normes de travail. In: *Bulletin Technique d'Information* - Ministère de l'Agriculture, Paris, n.442-443, p.353-358, jul./set. 1989.

[5] Montedo, U. B. *O trabalho agrícola familiar segundo a teoria da complexidade.* 167 f. (7 apêndices). Dissertation (Doctorate in Production Engineering) – Graduate Program in Production Engineering, UFSC, Florianópolis, 2001.

[6] Montedo, U.B.; Sznelwar, L.I. Análise Ergonômica do Trabalho Agrícola Familiar. In: *Produção*, v. 18, n. 1, p. 142-154, Jan./Abr. 2008.

[7] Guérin, F. et al. *Compreender o trabalho para transformá-lo.* São Paulo, Blücher, 2001.