

EGRAN : AN EUROPEAN GROUP FOR RABBIT NUTRITION PRESENTATION AND ACTIVITY

GIDENNE T.

INRA, Station de Recherches Cunicoles, BP 27, 31326 CASTANET, France.

ABSTRACT : A work-group on rabbit nutrition, called EGRAN, was constituted on a voluntary basis in 1992. It involved 6 teams having a continuous research program in rabbit feeding and belonging to 5 European countries. The main objective of EGRAN is to advance in the knowledge of the rabbit nutrition, through the achievement of common research programs. EGRAN also aims to promote scientific and technical cooperation within the group, ranging from scientific theory to basic chemical analysis. Exchange about the scientific program of each

team is also encouraged in order to avoid any undesirable duplicate research. Up to date the research program aims to harmonise and to improve the main methods used for feed evaluation. The achievement of a common methodological platform is a first step to perform concerted experiments and thus to develop a concrete cooperation between teams. From 1997 on, the research activity of EGRAN is developing because of a 5 years EU funding for a concerted action program (Erafe) described here.

RESUME : EGRAN - Un groupe de recherche européen sur la nutrition du lapin. Présentation et activité

En 1992, six équipes de chercheurs, appartenant à cinq pays de la communauté européenne, ayant tous des programmes suivis de recherche sur l'alimentation du lapin, se sont volontairement regroupés pour constituer un groupe de travail appelé EGRAN. Faire avancer la connaissance en matière de nutrition du lapin, en menant à bien des programmes de recherche communs, est l'objectif principal de EGRAN. EGRAN veut aussi promouvoir la coopération scientifique et technique à l'intérieur du groupe, en allant de la théorie scientifique jusqu'à l'analyse chimique de base, encourager la comparaison des

programmes scientifiques des différentes équipes afin d'éviter d'inutiles recherches en doublon. Actuellement le programme de recherche a pour but d'harmoniser et d'améliorer les principales méthodes d'évaluation des aliments. L'élaboration d'une méthodologie commune est le premier pas pour réaliser des expérimentations concertées et ainsi développer une coopération concrète entre les équipes. Les activités de recherche de EGRAN se sont accrues depuis 1997, grâce à un soutien financier de l'Union Européenne, pour une durée de 5 ans et dans le cadre d'un programme d'action concertée (Erafe) décrit ici.

INTRODUCTION

Research in the field of the rabbit breeding is present in many countries, but is not highly developed since the low economic weight of rabbit production causes slight funding by public institutions or private firms. In addition, rabbit research is very diffuse and also quite badly recognised by public authorities (university, government or European Union...). Efforts have to be done to improve the image of rabbit research (in terms of quality and organisation) and to maximise the efficiency of this research by means of cooperation among institutions and teams. This is the main possibility to increase the specific scientific knowledge on this species and to avoid an increasing arrearage compared with other species (e.g. partial digestibilities).

A first attainable step is to cooperate within the European Union (EU), for teams having similar research objectives. Besides the topic, the general objective is to stimulate common research activities in order to maintain or to develop the rabbit meat production.

For this reason, the European Group on Rabbit Nutrition (EGRAN) was founded eight years ago. So, one more group of scientists for rabbit research? Yes, but EGRAN is not a scientific association only speaking about research. It is a **working-group** engaged in the achievement of specific research programs. Before to explain in more details the foundation and the present

activity of EGRAN, the frame and the objectives of the group will be presented hereafter.

General objectives of EGRAN

The main objective of EGRAN is to produce scientific results in the area of the rabbit nutrition, based on a common research program (mainly using the so-called "ring-test" protocol). First, we aim to harmonise and to improve methods used for feed evaluation, because it is essential to have a common methodological platform if we want to exchange data or to perform concerted experiments.

EGRAN also aims to promote scientific and technical cooperation within the group, ranging from scientific theory to chemical analysis techniques (including statistics, experimental designs, exchange of literature, etc...).

Exchange about the scientific program of each team is also encouraged in order to avoid any undesirable duplicate research or futile competition.

Foundation and structure of EGRAN

Considering the importance of the above mentioned objectives, already in May 1991, a first workshop gathering 5 European teams involved in rabbit nutrition research, was held in Toulouse (France) at the initiative of INRA (Station de Recherche Cunicole).

The harmonisation of feed evaluation methods has been recognised as a priority that could be achieved

Table 1 : Members of the European Group on Rabbit Nutrition (EGRAN)

COUNTRY	Partners	Institution and city
BELGIUM	Luc Maertens An Van Herck	CLO : Agricultural Research Institute, Department of Animal Nutrition and Husbandry, Section Small Stock Husbandry, 9280 MERELBEKE
FRANCE	Thierry Gidenne Jean Marc Perez François Lebas	INRA: National Institute for Agricultural Research, Toulouse, Rabbit Research Laboratory, 31320 CASTANET-TOLOSAN
ITALY	Gerolamo Xiccato Angela Trocino	UPADU: University of Padova / Department of Animal Science, Agripolis, 35020 Legnaro, PADOVA
PORTUGAL	Luisa Falcao E Cunha Victor Pinheiro Joao Bengala Freire	ISAL: Technical University of Lisbon, Institute of Agronomy, Department of Animal Production, 1399 LISBON
SPAIN	Rosa Carabaño Maria Jesus Villamide Carlos De Blas	UPM: Politechnical University of Madrid, Agronomy Highschool, Department of Animal Production, 28040 MADRID
	Enrique Blas Concha Cervera Julio Fernandez-Carmona Juan José Pascual	UPV: Politechnical University of Valencia, Department of Animal Science, 46071 VALENCIA

only by a concerted action. All teams agreed to cooperate on a voluntary basis and to constitute a work-group in order to develop specific and common research programs. It appeared thus reasonable to restrict the number of teams of EGRAN, to manage more easily a research program.

The group was then constituted in 1992, by 6 teams (Table 1). All of them belong to European countries implicated in the production and consumption of rabbit meat (Belgium, France, Italy, Spain and Portugal), and have a continuous research program in the field of rabbit nutrition under rational breeding systems. The name of the work-group "EGRAN", acronym for European Group on Rabbit Nutrition, was adopted in 1994 during a meeting held in Padova (Italy). The administrative structure is very limited (no secretary office, no entry fees, etc.). At present, there is only a coordinator in charge for the overall management of a 5 years program (1997-2002), and project managers in charge to achieve each task identified in this program (Table 2). Since 1997, the activity of the group is developing

(Figure 1) because of the support of the European Union (EU). One general meeting and one or two workshops, lasting two or three days, are organised each year (restricted to EGRAN and invited scientists or experts). Apart from meetings, intensive discussions and exchanges (data, results or documents) are achieved through electronic mail, which is an essential tool to allow research under a network system.

Research activity of EGRAN

A) General frame of the research program

The central objective of our research activity is to harmonise and to improve the methods for evaluating compound feeds and raw materials used in rabbit feeding. Indeed, the feeding costs reach two-third of the total costs of an animal production. Therefore, improving the feed efficiency is essential not only to improve the competitiveness of the rabbit production, but also to reduce the output (e.g. nitrogen from faeces and urine) in the environment. A correct evaluation of the nutritive value of feeds is now a priority, because the feedstuffs employed are of

Table 2 : Management structure of the concerted action-Erafe (1997-2002).

TASKS/SUBTASKS	Partners					
	INRA	CLO	ISAL	UPADU	UPM	UPV
STAND					R	
STANDIT	R	P	P	P	P	P
STANDIN	P		P		P	R
NUVAR		R				
FEDA	P	P			R	
MEV	P	P	P	P	R	P
PREVAL				R		
NIRS	P	P		R		P
SIMUL			P	P	R	P
PrecHEM	R	P	P	P	P	P
SABA	R	R	P	P	P	P

General coordination of the project = INRA
P = Participant ; R = Responsible of a task (coordination and management of the task, involve the participation) or of sub-task.

various quality (agro-industrial by-products, fibre sources) and are often badly identified on a chemical or nutritional point of view. Moreover, associative effects between feedstuffs have been demonstrated earlier (MAERTENS *et al.*, 1986; GIDENNE, 1987; DE BLAS and VILLAMIDE, 1990), complicating the problem of the feed evaluation. Thus, the tables of feedstuffs nutritive value are either incomplete (e.g. ADL values or amino acid digestibility) or not reliable among them (INRA, 1989 ; MAERTENS *et al.*, 1990). The achievement of accurate harmonised tables, using a common system of feed evaluation, is a first order objective that needs a complete concerted action of the research teams. The development of a new methods and of a common system for the prediction of the nutritive value of the rabbit feeds (mainly for energy and protein) are essential secondary objectives.

This is also particularly important to develop a research network for rabbit feed evaluation to avoid the problems of standardisation encountered in other species (pigs, ruminants). In addition, each individual country is not able to give sufficient research support to meet these aims. Such an ambitious program could only be achieved, if we develop a research network and a

common methodological platform. These were the objectives of our first inter-laboratory studies, described below.

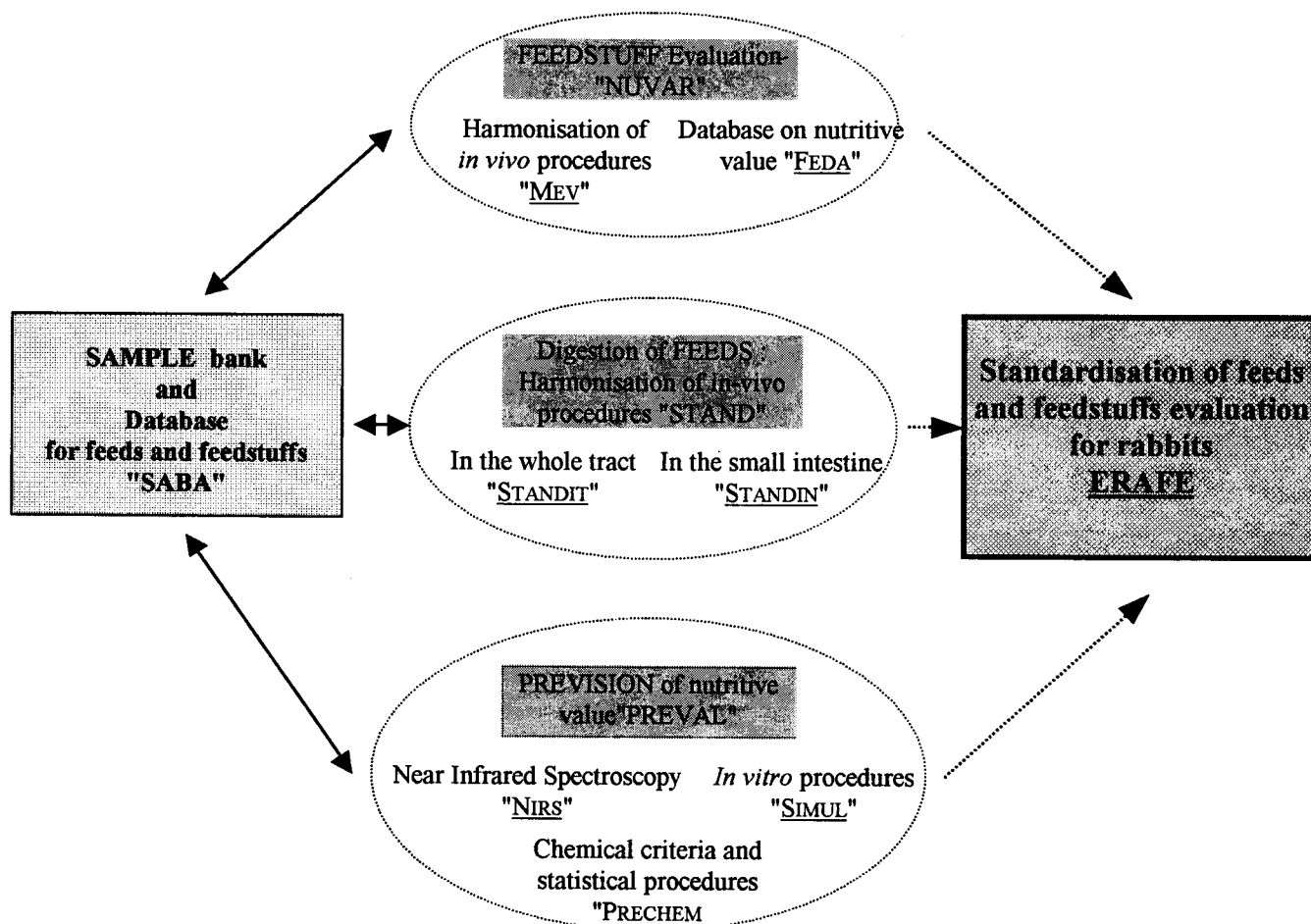
B) Inter-laboratory research activity between 1992 and 1996.

Several inter-laboratory studies were engaged during this period.

1. The first one concerned the procedures for ileal digestibility measurements. Conclusions of this collaborative study (GIDENNE *et al.*, 1994) pointed out the necessity for a close collaboration in this field of ileal digestibility procedures. This first study also proved the real possibility to work in network, and showed us the advantages of such an experimental model to obtain more powerful and reliable results.

2. In a second study, an *in vitro* method for the prediction of DM digestibility was performed in two laboratories on the same series of compound feeds (XICCATO *et al.*, 1994). This study showed significant differences in the results obtained in the two laboratories and evidenced the importance of the harmonisation of the analytical methodology used for the evaluation of rabbit feeds.

Figure 1 : Research tasks of the European concerted action "ERAFE".



3. The third inter-laboratory study was dedicated to propose an harmonised procedure for the determination of the *in-vivo* faecal digestibility. The reproducibility of this method was judged with the individual procedures followed by each team (n=6). These works were published (PEREZ *et al.*, 1995 a, b), and the harmonised "European" methodology is now recognised by many researchers. The method was also accepted as the official reference method by some National Scientific Committee (i.e. Associazione Scientifica di Produzione Animale in Italy).

4. Comparison of domestic procedures for basic chemical analysis (DM, ash, N, energy, fibre and fat) and the impact on digestibility values was the subject of the third collaborative study (6 teams). Indeed, according to nutrients relatively high among-laboratory variability coefficients were registered in the previous ring-test. The results of this study were published (XICCATO *et al.*, 1996), and showed the need for harmonisation in the field of the chemical analyses implicated in nutrient digestibility studies.

5. A last study was conducted to predict the chemical composition and the nutritive value of 66 rabbit compound feeds from 3 laboratories of EGRAN. This work, recently published (XICCATO *et al.*, 1999) showed the advantage of having a common data base and feed sample set to be used for concerted activities.

One of the "result" of the EGRAN activity was to elaborate in 1996, a more comprehensive research program, which was funded by the EU as a concerted action (five years duration : 02/1997- 02/2002). This program meets the above objectives (see A). It was called ERAFE (acronym for European Harmonisation of Rabbit Feed Evaluation), and is described hereafter (see also the figure 1). The EU supports only the coordination costs (not the research itself) associated to ERAFE, but this allows a significant acceleration of the scientific and technical progress.

C) Research activity from 1996 on ERAFE program (1997-2002).

The program was initially divided in three main tasks (STAND, NUVAR, PREVAL), themselves shared in sub-tasks (Figure 1). The system of management of ERAFE (Table 2) involve a general coordinator (Dr. Thierry GIDENNE - INRA) and coordinators (or project managers) for each task and subtask, in charge to follow experiments and to draft an annual scientific report.

Task 1) STAND "Standardisation of in-vivo digestibility determination of compound feeds".

It aims to harmonise and to improve *in-vivo* procedures to determine either total (sub-task STANDIT) or ileal

(sub-task STANDIN) digestibility of compound feeds for rabbits.

Presently a ring-test has been achieved to analyse the origin of the variability encountered for the faecal digestibility of nutrients (6 teams). Another ring-test was performed to harmonise and to improve the ileal digestibility measurements (4 teams).

Task 2) NUVAR "Nutritive value of feedstuffs".

It aims to improve the evaluation of the nutritive value of feedstuffs used in rabbit feeding, throughout the achievement of two subtasks : the harmonisation and improvement of *in-vivo* experimental procedures to evaluate the nutritive value of feedstuffs (sub-task mev), and the elaboration of a concerted European Database on nutritive value of raw materials used in rabbit feeding (sub-task FEDA).

A first version of European table on nutritive value of raw material was presented during the 7th French Scientific Rabbit days (PEREZ *et al.*, 1998) and published as a chapter of the book "The nutrition of the rabbit" (VILLAMIDE *et al.*, 1998). At present, the EGRAN execute a collaborative study aiming to judge different experimental procedures for feedstuffs evaluation (4 teams involved).

Task 3) PREVAL "Methods to predict the nutritive value of feeds and feedstuffs"

It aims to develop or improve methods to predict the nutritive value of feeds and raw materials, throughout two objectives : the development and validation of new methods to predict the nutritive value, including Near Infrared Reflectance Spectroscopy (NIRS) or enzymatic procedures to simulate digestion (sub-tasks NIRS and SIMUL) ; the improvement of prediction equations based on chemical parameters, and research of new chemical parameters (sub-task PRECHEM). The harmonisation of NIRS analysis of rabbit feeds using common calibration on the spectra obtained in the different laboratories is presently in progress as well the enlargement of the set of samples. A common *in-vitro* digestion procedure was also subjected to a ring-test in 1998 (SIMUL) and showed good repeatability and reproducibility of the technique. Further assays are in progress to improve these results for predictive purposes in raw materials. On the other hand, the EGRAN is attempting to harmonise nutrient chemical analyses.

Moreover, a fourth task "SABA" was identified after a first year work (1997) and considered essential for the correct advancement of the program: the elaboration of a common sample bank (feeds and feedstuffs) and of a corresponding database (containing data on chemical composition and nutritive value).

Task 4) SABA "European sample bank and database".

It is a fundamental tool that enables future studies aiming to compare the validity of the procedures in feed evaluation. Indeed, each partner of EGRAN performs in-vivo digestibility trials to measure the nutritive value of rabbit feeds or feedstuffs. The two past ring-tests demonstrated the importance of using a common harmonised procedure for these time consuming in-vivo measurements, in order to reduce the variability and thus improve the reliability of the results. Moreover, most of the partners do not store for a long term samples of the essayed feeds and/or feedstuffs. In view of predicting the nutritive value, a sufficiently large and reliable dataset is necessary to achieve this goal. Furthermore, a common sample bank makes it possible to harmonise chemical, in vitro or NIRS analyses. Earlier efforts with other species (pigs, poultry) and rabbits have clearly shown the limits of a data bank without a sample bank. The sample bank is presently under the responsibility of INRA, while the database is under the responsibility of CLO.

Other activities of the EGRAN and perspectives

Obviously, the achievement of the program ERAFE implies many exchanges and discussions between teams, ranging from the control of the laboratory analytical procedures to the research project management (how to answer to EU calls for projects ?) or the publication of results (choice of the support, etc.). Besides, EGRAN has suggested some topics that might be treated in round tables during the 7th World Rabbit Congress (Valence 2000 - Spain).

After the elaboration and publication of recommendations to perform in-vivo faecal digestibility experiments (PEREZ *et al.*, 1995b), EGRAN is now working on a "laboratory guideline" for the chemical analysis of basic nutrients in feeds and faeces. Hence, a general guideline would be available for measuring the digestibility of the main nutrients. This activity is an example of how EGRAN is managing the important problem of increasing the quality of research. In perspectives, a "basic methodological platform" corresponding to general recommendations and guidelines for applied nutrition trials with rabbit would be an ambitious goal.

CONCLUSION

Up to date, 6 teams are members of EGRAN. Obviously, we keep in mind that EGRAN is not fully representative of the European research on rabbit nutrition. In return, it is presently a convenient system to complete correctly and in a reasonable time a quite complex research program through a concerted action.

The possibilities to open the EGRAN group itself to other teams are limited at present, because of the achievement of the research program in progress (ERAFE). However, we are willing to receive any suggestion to build up a broader working group. More largely, we are interested to developed relationships between our group and other research groups in rabbit production (e.g. in reproduction or pathology etc.). The "horizontal" coordination of the research programs (multidisciplinary approach) in rabbit science would be therefore improved. Besides, EGRAN could be a first "stone" towards the constitution of a commission for rabbit nutrition under the responsibility of the World Rabbit Science Association.

Acknowledgements : The author wish to thank Luc MAERTENS (CLO - Agricultural Research Institute, Belgium), Rosa CARABAÑO and Maria Jesus VILLAMIDE (Polytechnical university of Madrid), Gerolamo XICCATO (University of Padova), Concha CERVERA (Polytechnical university of Valencia) and Jean Marc PEREZ (INRA, Toulouse) for their essential help in preparing the text. The members of EGRAN would also thank all technicians and students which help to the achievement of our research objectives.

Received : May 20th, 1999

Accepted : June 12th, 1999.

REFERENCES

- DE BLAS C., VILLAMIDE M.J., 1990. Nutritive value of beet and citrus pulp for rabbits. *Anim. Feed Sci. Technol.*, **31**, 239-246.
- GIDENNE T., 1987. Effet de l'addition d'un concentré riche en fibres dans une ration à base de foin, distribuée à deux niveaux alimentaires chez la lapine adulte. 2/ Mesures de digestibilité. *Reprod. Nutr. Dev.*, **27**, 801-810.
- GIDENNE T., BLAS E., CARABAÑO R., MERINO J. M., 1994. Effect of ileal cannulation on rabbit digestion and caecotrophy : an interlaboratory study. *World Rabbit Sci.*, **2**, 101-106.
- INRA, 1989. Alimentation des lapins. In : "Alimentation des animaux monogastriques : porc, lapin, volailles". *Inra éditions, Paris, 2ème édition, Chap. 8.*
- MAERTENS L., HUYGHEBAERT G., DE GROOTE G., 1986. Digestibility and digestible energy content of various fats for growing rabbits. *Cuni-Sciences*, **3**, 7-14.
- MAERTENS L., JANSSEN W. M. M., STEENLAND E., WOLTERS D. F., BRANJE H. E. B., JAGER F., 1990. Tables de composition, de digestibilité et de valeur énergétique des matières premières pour lapins. *Proc. 5èmes J. Rech. Cunicole Fr., 12-13 Déc., Paris, INRA et ITAVI ed., Vol. II, comm. 57.*
- PEREZ J.M., CERVERA C., FALCAO E CUNHA L., MAERTENS L., VILLAMIDE M.J., XICCATO, G., 1995a. European ring-test on in-vivo determination of digestibility in rabbits : reproducibility of a reference method compared with individual laboratory procedures. *World Rabbit Sci.*, **3**, 171-178.

- PÉREZ J.M., LEBAS F., GIDENNE T., MAERTENS L., XICCATO G., PARIGI-BINI R., DALLE ZOTTE A., COSSU M.E., CARAZZOLO A., VILLAMIDE M.J., CARABAÑO R., FRAGA M.J., RAMOS M.A., CERVERA C., BLAS E., FERNÁNDEZ CARMONA J., FALCAO E CUNHA L., BENGALA FREIRE J., 1995b. European reference method for in-vivo determination of diet digestibility in rabbits. *World Rabbit Sci.*, 3, 41-43.
- PÉREZ J. M., MAERTENS L., VILLAMIDE M. J., DE BLAS C., 1998. Tables de composition et de valeur nutritive des aliments destinés au lapin : conclusions d'un groupe de travail Européen. *Proc. 7èmes J. Rech. Cunicole Fr.*, 13-14 Mai, Lyon, France, 141-146.
- VILLAMIDE M.J., MAERTENS L., DE BLAS C., PÉREZ J.M., 1998. Feed evaluation. In : C. DE BLAS and J. WISEMAN (Eds.) *The nutrition of the rabbit*. CAB International Publishing. Oxon UK, Chap. 6, pp89-101.
- XICCATO G., COSSU M.E., CARAZZOLO A., CARABAÑO R., RAMOS M.A., 1994. Evaluation in vitro de la valeur nutritive des aliments pour lapins: efficacité de différents enzymes digestifs. *Proc. 6èmes J. Rech. Cunicole Fr., La Rochelle, France, 6-7 Déc., Vol. II, 375-383.*
- XICCATO G., CARAZZOLO A., CERVERA C., FALCAO E CUNHA L., GIDENNE T., MAERTENS L., PÉREZ J.M., VILLAMIDE M.J., 1996. European ring-test on the chemical analyses of feed and faeces influence on the calculation of nutrient digestibility in rabbits. *Proc. 6th Congress of the World Rabbit Sci. Assoc.*, 9-12 July, Toulouse, France, vol. I, 293-297.
- XICCATO G., TROCINO A., CARAZZOLO A., MEURENS M., MAERTENS L., CARABAÑO R., 1999. Nutritive evaluation and ingredient prediction of compound feeds for rabbits by near infrared reflectance spectroscopy (NIRS). *Anim. Feed Sci. Technol.*, 77, 201-212.