SUMMARY

The main objective of this thesis was to know and quantify the importance of the various factors of the pig production on animal performance during the growing-finishing phase. In order to achieve this main objective, a set of three studies (chapters 5 to 7) were performed and they will be detailed as follow.

In the **first study** it was built a data set including productive performance and production factors data of growing-finishing pigs in Spain in order to perform a representative and reliable description of the traits of Spanish growing-finishing pig industry. Data from 764 batches from 452 farms belonging to nine Spanish companies (1,157,212 pigs) were collected through a survey including four parts: general information, facilities, feeding and performance parameters obtained between 2008 and 2010. Most studied farms: had only growing-finishing pigs on their facilities (94.7%), produced ¨industrial¨ pigs (86.7%), had entire male and female (59.5%) and Pietrain-sired pigs (70.0%), housed between 13-20 pigs per pen (87.2%), had ≥ 50% of slatted floor (70%), single-space dry feeder (54.0%), nipple drinker (88.7%) and automatic ventilation systems (71.2%). A 75.0% of the farms used three feeding phases using mainly pelleted diets (91.0%), 61.3% performed three or more antibiotic treatments and 36.5% obtained water from the public supply. Continuous variables studied had the following average values: number of pigs placed per batch, 1,515 ± 949 (SD) pigs; initial and final body weight, 19.0 ± 2.56 and 108 ± 6.2 kg; length of growing-finishing period, 136 ± 12 days; culling rate, 1.4 ± 1.23%; barn occupation, 99.7 ± 1.36%; feed intake per pig and fattening cycle, 244 ±

26.1 kg; daily gain, 0.657 ± 0.0650 kg; feed conversion ratio, 2.77 ± 0.178 kg/kg and mortality rate, 4.3 ± 2.64%. Data reflecting the practical situation of the Spanish growing and finishing pig production may contribute to develop new strategies in order to improve the productive and economic efficiency of growing-finishing pig units.

The **second study** was designed to develop the first models in order to predict the effect of animal management and farm facilities on total feed intake (TFI), feed conversion ratio (FCR) and mortality rate (MORT) of grow-finishing pigs. Thus, with the aim of reducing variability in the database it was proposed standardize some production factors as the breed of the sire pigs, gender of the animals placed in batches as well as initial and final body weight interval. In total, 316 batches from 246 grow-finishing farms, consisting of 459,148 Pietrain sired pigs in six Spanish pig companies were used. Data collection consisted of a survey on management practices (season of placement, split-sex by pens, number of pig origins, water source in the farm, initial or final body weight) and facilities (floor, feeder, ventilation or number of animals placed) during 2008 and 2009. Results indicated that batches of pigs placed between October and March had higher TFI, FCR and MORT than those placed between April and September ($P < 0.01$); batches which had split-sex pens had lower TFI and better FCR than those with mixed-sex in pens ($P < 0.001$); pigs fed with a single-space feeder with incorporated drinker also had the lowest TFI and best FCR in comparison to single and multi-space feeders without a drinker ($P < 0.001$). Pigs placed in pens covered by slats to less than 50% presented an improvement in FCR than pens covered by slats to 50% or more ($P < 0.05$). Batches filled with pigs from multiple origins had higher MORT than those from a unique origin ($P < 0.01$). Pigs housed in barns

that performed manual ventilation control presented higher MORT in comparison to automatic ventilation ($P < 0.001$). Small batches (< 800 pigs placed) had the lowest MORT than medium (800-2000 pigs) and big batches (> 2000 pigs) ($P < 0.01$) and finally pigs which were sent to slaughterhouse with an higher final body weight presented higher TFI and poorer FCR ($P < 0.05$). The R^2 values obtained in each model were 0.63 for TFI, 0.27 for FCR and 0.20 for MORT. Results showed that in general TFI, FCR and MORT were influenced by the trimester of placement of the batches in the facilities, number of pig origins of the pigs, sex segregation in pens, type of feeder and ventilation control, percentage of slat in pens and initial and final body weight.

The **third study** aimed to collect available information from a representative number of pig producing companies in Spain using two different lineal regression approaches. Thus, information from 686 batches of growing-finishing (GF) pigs from 404 GF farms integrated in seven Spanish companies was obtained between July 2008 and July 2010 by survey. Factors affecting feed conversion ratio (FCR) and mortality (MORT) were studied by multiple linear regression analysis in each single company (A to G) and in an overall database (OD) that contained data from six of these companies. Factors studied were geographic location of the farm, trimester the pigs entered the farm, genetics, gender, use of circovirus vaccine, number of origins the pigs were obtained from, age of the farm, percentage of slatted floor, type of feeder, drinker and ventilation, number of phases and form of feed, antibiotic administration system, water source, and number and initial weight of pigs. Variability among companies was much higher than within companies and some factors presented no variability within companies. In two or more companies studied and/or in OD, the trimester when pigs were placed in the farm (A, $P < 0.05$; B, $P < 0.001$; C, $P <$

0.10; E, $P < 0.01$ and OD, $P < 0.01$), genetics-gender-sex segregation (B, $P < 0.10$; C, $P < 0.01$ and OD, $P < 0.01$), number of origins of the pigs (C, $P < 0.10$; G, $P < 0.10$ and OD, $P < 0.01$), age of the farm (D, $P < 0.01$ and F, $P < 0.05$) and initial body weight (A, $P < 0.001$; D, $P < 0.001$; G, $P < 0.001$ and OD, $P < 0.001$) were the most important factors affecting FCR. With regarding to the mortality, trimester of placement (A, $P < 0.10$; B, $P < 0.001$; C, $P < 0.05$; E, $P < 0.05$; F, $P < 0.05$ and OD, $P < 0.001$), number of origins of the pigs (B, $P < 0.10$; C, $P < 0.01$; G, $P < 0.05$ and OD, $P < 0.001$), water source in the farm (A, $P < 0.05$ and E, $P < 0.05$), number of pigs placed (B, $P < 0.05$; F, $P < 0.05$ and OD, $P < 0.001$) and the initial body weight (D, $P < 0.10$ and E, $P < 0.05$) were considered the main factors. Age of the farm, antibiotic administration system, and water source were only provided by some of the studied companies and were not included in the OD model, however, when analyzed in particular companies these three variables had an important effect and may be variables of interest in companies that do not record them. It was observed that models developed by company were more accurate and reliable than those originated from the overall database.