

MORTALITY VERSUS PROFITABILITY IN A ROMANIAN SWINE FARM

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Abstract

In a world with a continuously major demographic increasing, the global economy will be oriented to a correct path „the economy of rationality and hope”, which has to ensure the world’s rapidly demand and needs for food. As an important economic branch, a sustainable agriculture must simultaneously deliver food security, environmental sustainability and economic opportunity. In such a global environment, Romanian swine farms are vertically integrated into farrowing operations, the piglets grow and are fed until they reach market weight and at the end, they are slaughtered. There are many criteria for assessing good results in an integrated pigs farm, such as the volume, structure and quality of pigs produced, present and future possibilities to improve the activity, at what cost and with what investment effort and risks. An inherent risk of a swine farm with a huge impact to profitability and financial equilibrium is represented by pig mortality. For this reason we have analysed it at a farm level, taking into account that the mortality’s rate is the main issue that characterize the management in a swine farm. The analyses were made with the aim to reduce the economic effect of mortality, to review and improve the welfare conditions for pigs, to adapt them to the requirements of modern genotypes, increasing the prolificacy with a direct impact to reduce the financial loss due to pigs death.

Key words: swine farm, mortality, profitability, economic rationality

INTRODUCTION

In a global world characterized by a financial and moral crisis, all EU economies and even the current Romanian economy require an open, transparent and dynamic trend. The management needs to combine classic economic elements, but also updated elements in an unique synthesis following the path to a new framework of ideas, leading to a more complex study of the economical issued through the glass of the balance and unbalance at different levels and economic structures.

The global food system today is marked by serious challenges and risks, due to major demographic increasing which changes the rapidly demand for food. The international statistics forecast a world population of around 9 billion in the following 20 years, which will

determine a significant increase of global food demand [7]. All these are driving to a new challenge of the agricultural food sector, which will have to feed a bigger population in future and will require substantial movements to ensure the production, distribution and consumption of sufficient nutritious and sustainably produced food.

So, in the foreseeable future the economic trend of the global economy will be „the economy of rationality and hope”, which tends to change the individual and the communities in which they work in, taking them to a healthy way of life, coexisting with all the generations and also to strive to succeed. The global economic development has to settle and stimulate the health of the entire eco system, the unity between people, environment,

organizations, institutions and communities.[1]

The modern agriculture will generate a lot of economic opportunities for global investors, in order to sustain the world food demand and in the meantime to assure food security and environmental security. [12]

In such a global environment, commercial swine farms are a popular form of livestock, with more than one billion pigs killed each year worldwide and the pigs are used for human food and some parts as skin, fat, organs, are used for clothing factories, ingredients for processed foods, medicine and other use.

Modern Romanian swine farms are vertically integrated into farrowing operations, where sows are impregnated and continually give birth, the piglets grow and are fed until they reach market weight and at the end of the cycle they are slaughtered.

Especially in pigs farms the responsibilities are assigned to two groups: a) individual responsibilities reflect how they do their job properly, talking care of animals and b) how the middle and top management assure the financial and material resources and design the strategy of the farm, in such a way to assure animal welfare and the health of the entire eco system and in the meantime to earn profit in a free market economy [9].

Obviously, there are many criteria for assessing good results in an integrate pigs farm. In this context it arrases the resolution of fundamental problems related to volume, structure and quality of pigs to be produced, present and future possibilities to improve the activity, at what cost and the way to deal with distribution and the market evolution of pigs produced [10].

A current risk which affect the profitability of a swine farm is represented by pig mortality.

There are a number of potential reasons which influence the growth in pig mortality, like:

-Genetics has changed dramatically over the last period and selection for production traits has been correlated over time with a decrease in liveability;

-The usage of all-in, all-out pig flow, has also led to the common use of multi-site production systems and pig flow dynamics may have negatively impacted overall herd immunity;

-There are numerous bacterial and viral diseases that may cause pig mortality, out of which without any doubt PRRS is the most costly of these.

-A great risk for a swine farm is the opportunity for entry of exotic viruses such as foot-and-mouth virus, African Swine Fever, or Classical Swine Fever (Hog Cholera), so the managers have to remain vigilant and responsive to this risk.

On a roughly analysis it seems that the number of pigs dying in European area appears to be on a slow, but steady climb in the last three years. Talking into consideration all risks in pigs current industry, it results that a main issue of the management strategy in a swine farm to reduce the economic effect of mortality is to review and improve the welfare conditions for pigs, to adapt them to the requirements of modern genotypes, increasing the prolificacy with a direct impact to reduce the financial loss due to mortality[8].

MATERIALS AND METHODS

In order to prove the economic impact of pig mortality on financial loss, it was made a study in a Romanian private swine farm, located in Dobrogea, S-E area of Romania, in Constanta county and which, for confidentiality reasons, we will call it Black Sea Farm.

It has a capacity of around 2,000 productive sows, which will be extended during 2016 up to 2,600 sows. Black Sea Farm is a full-integrated project as well, producing piglets for fattening. The expected number of fattened pigs, once all sows will be in full production is estimated to rise to 60,000 heads. The farm has an own feed mill, grain storage facilities as well as a BIOGAS – installation under construction, made with EU funds and with owners investments financing and will be operational at 2016 end, for the production of electricity.

During our study we have taken in consideration the fact that the business environment imposes the need for clarification and a realist understanding of the economic impact of mortality in a pig farm, which needs to be assimilated on the premised of an accurate analyse of all risks overview.

The economic coordinates in swine farm can be synthesized based on object, method and function. National and international experience all share the necessity of implementing in the process of growing pigs some characteristics:

The pig grow theory must be seen differently now and its main objectives of study were changed. In present time this analyse went on tracking all the changings of conditions in which the pigs are growing in modern farms and all practical aspects.

This means that the tendencies of one period are intertwined with the general worldwide tendencies in the macroevolution process started in the early 90's, as no clear predictions were ever made even if we can hint some important ones. The important fact is that the production analyse for a swine farm in the future will be a creative leap on the premises of scientific and technological revolution as a worldwide trend. The science-technic revolution is defined through deep transformation – agricultural, environment, veterinarian, biological, physical, chemical, informational, automatic feeding and survey, etc. We also need to take into consideration the production management strategy and economic-financial status which bring new ending to pigs grow business.

The production and financial approach methodology and techniques adds a new perspective between the potential risks and the enforcement of the economic impact in the production activity of a pig farm. This means catching the authenticity of the economic factor, taking out some oversized assumption and errors for some fundamental parts of practices such as: the productive function of a pig farm, the pigs free market evolution and requirements, the role of the consumer, the link between continuity and economic change and updating the technology and privatization.[11]

a) This process is going towards interdisciplinary and more-disciplinary actions. The cause of this trend are the complexity in all production farm departments, the updated technical process of the study, creating relations between trainings in pigs industry and practical one, between fundamentals and the applied ones in a modern learning curricula, accentuating the

dimensions of practice experience, shifting towards structural theories made for the natural and human environment. In these circumstances the growing pigs' methods need to be in contact with all social and biological sciences. It will need to approach humans as consumers and work resources and also the decision factor in order to open new leads of risks investigation, more refines instruments of mortality avoidance and animals' measurement of welfare, improvement of the economic analysis.

b) Another approach is the integration of the processed into the era of computers, for viewing sows insemination, farrowing, feed consumption, gain evolution, etc.

c) Another important aspect is the flow towards logic. In practice, for developing and growing pigs there are some empiric investigation and also logical patterns involved. So more functions are in place in modern farms – methodological function, heuristic, explanatory and researching method. In the current economic environment, can be find more of the ideas of worldwide casuistry, profitability, and multiple interaction. At the same time logical patterns are used as models, mathematical logic is also used in identifying the cycles for pigs, laws, theories and principles.

In this period of continuously world demographic growing, the Romanian agricultural, as part of global economy, on the European pattern, has to improve its role and functions, to rise in importance and there is a need to improve it and elaborate it on a long term program. Without a real development of all agricultural branches, Romania would need to find in the dark the way through economic problems, argumentative opinions and opposite political proposes.

The economic development of swine grow is a new trend in our country and also for others in the European region, where the decision and political view to reform and make the pigs farms more efficient in order to surpass this current crisis are crucial for success. For this reason the decreasing of mortality risks, helps the farmers in choosing the correct path to diminish the tension between limited, scarce, expensive, un reachable resources and the

current growing and divers human needs for food. In this manner we can overcome the shortage and limitations imposed by nature and acting rationally in the social economic environment, levelling goals and responsibility and also results in an coherent historic and economic system.[10]

Lifting the pig grow on a coherent way, allows a more accurate understanding of the dynamics of the agricultural economy on a long run and in a word wide view.

As such the decisions which are taken in order to smother the free market competition are complex and important as we need to keep in mind also a lot of other aspects such as adhesion, integration, harmonization, convergence, and globalization. And also the need of a reconstruction of spiritual aspects to form a durable evolution of the knowledge society. In this context the ideology suffers mutations and they are still present as in the past. There is also the reverse where we make the role of the free market absolute and the balance is fragile and very scare.

When political decision of economic and financial aspects are taken it is taken out the dimension and the social impact of the economic processes which will generate sooner or later high costs, economical unbalance, social and ecological changes very hard to contain revealing certain processes are harmful, but considered as normal in the Romanian economic life, as deindustrialization, fraudulent privatization, corruption, etc.. However, scientific and coherent economic theory to assess fair and realistic-scientific orientation further transformational economic and financial movements in a particular environment led sustainable development and European integration, national identity as authentic samples [3]. The important methods of financial analysis were:

Horizontal Analysis, for comparing pigs stock evolution, mortality, feed consumption, over different months or defined periods within a fiscal year. .

One of the two methods used for a horizontal analysis:

- the first way method of horizontal analysis in which the amounts in absolute values of

various production and financial items were compared over different periods of time, helping us to analyse the spending trends of the Black Sea pig farm business. Besides, it also helped us to analyse the effects of external factors which affected the rise in mortality, over business profitability.

- Percentage analysis based on the change in different items over different periods of time, showing the performance of production flows, in different periods of time.

Ratio Analysis. This is the method in which the ratio between two or more variables related to pig production is compared, such as: mortality ratio, feed consumption ratio, farrowing ratio, financial loss ratio, etc.

All the ratios presented above, used in our study case are collectively used to carry out the production analysis of pig business to assess growth, profitability, and solvency of Black Sea Farm.

All information and figures provided for our research by Black Sea Farm, were interpreted by us from quantitative and qualitative point of view. In our study, we took into consideration the socio-economic factors, concerning attitudes, opinions background, behaviours, inherent risks, which were used in quantitative research as well as in qualitative one. The most important method used in this research was financial analysis, because in a pig farm it carry out an important analysis based on the production results. We have compiled the information provided by business statements, reviews them with the help of business representatives to ensure their accuracy [5].

RESULTS AND DISCUSSIONS

Pigs Livestock analysis

Our case study started with the presentation of pigs' stock evolution for a period of three years, from January 2013 up to December end 2015. During this period, the total number of pigs on categories raised year by year, from a total number of 26,836 pigs at December end 2013 to 27,121 pigs at December end 2014 and attended a maximum of 31,111 pigs on December end 2015, as follows:

Table 1. Pigs livestock by categories-Comparative figures 2013-2015

Explanation	Boars	Sows	Repl. young boars	Replacement Gilts	Piglets	Growers	Testing Young boars	Testing Gilts	Fatteners	TOTAL	
Stock December 2013	Pigs no	13	1,789	-	652	3,244	8,681	-	860	11,597	26,836
	Total weight	1,997	310,992	-	98,263	11,353	146,606	-	50,226	834,406	1,453,843
	Average weight/pig	153.62	173.84		150.71	3.5	16.89		58.4	71.95	54.18
Stock December 2014	Pigs no	9	1,861	12	1,016	3,693	8,970	-	869	10,691	27,121
	Total weight	1,253	320,104	1,590	165,340	18,610	172,467	-	89,618	846,986	1,615,968
	Average weight/pig	139.22	172.01		162.74	5.04	19.23		103.13	79.22	59.58
Stock December 2015	Pigs no	14	2,000	2	630	3,545	9,406	-	340	15,174	31,111
	Total weight	3,291	387,186	310	116,481	14,272	189,472	-	25,337	1,006,932	1,743,281
	Average weight/pig	235.07	193.59		184.89	4.03	20.14		74.52	66.36	56.03
% December 2015/2014	Pigs no	155.56%	107.47%		62.01%	95.99%	104.86%		39.13%	141.93%	114.71%
	Total weight	262.65%	120.96%		70.45%	76.69%	109.86%		28.27%	118.88%	107.88%
	Average weight/pig	168.85%	112.55%		113.61%	79.89%	104.77%		72.26%	83.76%	94.04%

Source: Calculations based on the Black Sea Farm internal data

Mortality analysis

While the number of pigs presented above was rising each year, from 2013 to 2015, during our research, we have ascertained that the number of pigs from different categories (starting with piglets, growers, and ending with fatteners) dying ratio was also rising. All the computation was done from the information designed by Black Sea Farm in its standard monthly production report and animals movement. The rising of dying ratio in the meantime with the rising of crowd is due in our opinion to the following reasons:

They has not a stable plan for genetics:

-Crowd increasing was not monitored properly on categories;

-Pig flow increasing has a negative impact to herd immunity;

-Pig flow used was all-in, all-out, leading to the use of multi-site production systems;

-Disease issues were not managed properly;

-Mycoplasma pneumonia and porcine reproductive and respiratory syndrome (PRRS) were major problems;

-The disease control system was weak and not well correlated with vaccination program.

Mortality evolution per pig category in Black Sea Farm during the analyzed years is presented in Table 2.

Table 2. Yearly Mortality - comparative figures - 2013-2015

Explanation	Cumulated mortality January-December						%	
	2013		2014		2015		Year 2015/Year 2014	
	Heads	KG	Heads	KG	Heads	KG	Heads	KG
Boars	2	540	1	320	5	1,320	500.00%	412.50%
Sows	1,670	18,015	153	29,875	205	36,035	133.99%	120.62%
Replacement young boars	-	-	1	100	-	-		
Replacement Gilts	1,546	2,137	64	8,205	69	10,250	107.81%	124.92%
Piglets	5,700	15,426	6,056	14,972	6,138	16,809	101.35%	112.27%
Growers	6,363	31,985	2,224	28,041	3,519	49,066	158.23%	174.98%
Testing Young boars	-	-	-	-	-	-		
Testing Gilts	549	3,115	91	9,410	90	7,715	98.90%	81.99%
Fatteners	14,235	115,296	2,314	126,424	3,215	152,821	138.94%	120.88%
TOTAL	30,065	186,514	10,904	217,347	13,241	274,016	121.43%	126.07%

Source: Calculations based on the Black Sea Farm internal data

Annual total mortality (heads and Kg) had a significant rise in 2015, compared to 2014, increasing by 21.43% for pig heads and by 26.07% for pig Kg.

Table 3. Mortality rate (%) by categories

Explanation	Mortality rate (%) on categories					
	2013		2014		2015	
	Heads	Kg	Heads	Kg	Heads	Kg
Boars	10.00	14.84	6.67	7.84	14.29	16.74
Sows & gilts	2.06	1.99	3.27	3.23	4.37	3.79
Maternity	9.20	4.92	11.00	5.04	9.17	4.72
Nursery	5.19	2.05	4.12	1.77	5.31	2.74
Finishing	4.90	2.43	4.55	2.67	5.21	2.83
Total	6.28	2.39	6.44	2.69	6.51	3.05

Source: Calculations based on the Black Sea Farm internal data

Table 4. Mortality in maternity – Yearly comparative figures 2014-2015

Month	Starting stock		Farrowing in month	Total piglets in month		Mortality	
	Heads	Kg	Heads/Kg	Heads	Kg	Heads	Kg
	<i>1</i>	<i>2</i>	<i>3</i>	<i>4=(1+3)</i>	<i>5=(2+3)</i>	<i>6</i>	<i>7</i>
January	113.84	163.92	97.05	103.36	142.39	52.54	63.73
February	142.54	198.88	97.68	115.22	166.25	90.56	101.84
March	132.28	190.72	133.97	133.21	174.79	110.16	139.95
April	181.32	231.31	122.88	145.67	198.14	76.10	94.20
May	175.03	229.74	134.33	148.32	192.64	71.16	85.98
June	177.83	217.71	127.90	147.00	188.16	51.76	64.78
July	148.32	173.06	140.99	144.12	164.45	123.94	94.41
August	171.81	183.27	124.09	141.82	164.34	186.98	140.22
September	152.84	164.78	149.52	151.07	161.38	181.16	165.44
October	116.10	93.92	110.38	112.64	97.79	204.31	203.31
November	98.61	77.18	144.33	118.46	86.54	178.95	202.42
December	113.33	86.90	108.51	110.53	91.31	115.47	153.16
Total	113.84	163.92	122.14	121.65	123.32	101.35	112.27

Source: Calculations based on the Black Sea Farm internal data

In maternity, mortality rate (computed per heads and per Kg) increased in 2015, compared to 2014, by 1,35% for heads and by 12,27% for Kg. This means that the piglets died closer to the weaned period, not in the first days after birth.

Mortality rates were huge in 2015 and in our opinion, it is a big question mark that the ongoing principle could be assured in a foreseeable future with the same bad management. The major decision in order to save the farm is to change the key managers, such are: general manager, production manager and the veterinarian.

In order to reduce the mortality to acceptable levels, the new management has to[4]:

-implement early gilt development;

-change vaccination programs, by improving sow vaccination programs to increase pig immunity downstream;

-improve timing of nursery vaccination

-increase weaning age;

-improve the conditions for animal welfare.

Farrowing index analyze

We have started our analyze for farrowing, having in view that the most critical period in the life cycle of a pig is from birth to weaning and every farrowing is different. Practice proves that during the farrowing period, on average, about two pigs per litter are lost.[6]

In Black Sea Farm, the average gestation period for sows was between 114 days to 116 days. We have obtained information about the method used to identify all pregnant sows and the schedule when sows were due, which was

designed to help the producer determine farrowing date based on the date sows are bred. Taking into consideration that the farrowing index and non-productive days are interconnected and important key performance

indicators for the breeding herd, we have analyzed also these indicators for 2014 and 2015 (Table 5).

Table 5. Farrowing index 2015

December 2015															
No	Month	Sows and gilts	Insemin. No.	Insemin. rate %	Month	Farrowing sows & gilts	Piglet Birth	Piglets per farrow sow	Weaned Sows	Died sows after farrow	Total sows weaned	Weaned piglets	Aver. piglets weaned per sow	Total KG Wean. piglets	KG Weight per Piglet at Weaning
	0	1			2	3	4	5=(4:3)	6	7	8=6+7	9	10=9:8	11	12=11:9
1	Oct-2014	2,633	707	72.28%	Jan-2015	511	5,232	10.24	436	3	439	3,888	8.86	23,794	6.12
2	Nov-2014	2,657	744	63.44%	Feb-2015	472	4,968	10.53	481	3	484	4,405	9.10	26,430	6.00
3	Dec-2014	2,659	653	79.63%	Mar-2015	520	5,778	11.11	480	4	484	4,647	9.60	27,882	6.00
4	Jan-2015	2,695	628	78.34%	April-2015	492	5,642	11.47	610	2	612	6,214	10.15	37,284	6.00
5	Feb-2015	2,638	570	87.89%	May-2015	501	5,815	11.61	448	1	449	4,668	10.40	28,008	6.00
6	March-2015	2,616	728	60.71%	June-2015	442	5,377	12.17	437	1	438	4,812	10.99	28,872	6.00
7	April-2015	2,613	615	84.23%	July-2015	518	6,016	11.61	546	2	548	6,128	11.18	33,152	5.41
8	May-2015	2,625	734	62.40%	Aug-2015	458	4,991	10.90	405	4	409	3,902	9.54	20,574	5.27
9	June-2015	2,628	659	68.29%	Sept-2015	450	5,000	11.11	536	2	538	5,349	9.94	29,374	5.49
10	July-2015	2,552	612	76.80%	Oct-2015	470	5,305	11.29	450	7	457	4,537	9.93	23,814	5.25
11	Aug-2015	2,573	734	52.86%	Nov-2015	388	4,376	11.28	398	2	400	4,013	10.03	20,683	5.15
12	Sept-2015	2,528	637	69.23%	Dec-2015	441	4,958	11.24	461	1	462	4,725	10.23	25,226	5.34
13	Total year	31,417	8,021	70.60%	Total 2015	5,663	63,458	11.21	5,688	32	5,720	57,288	10.02	325,093	5.67
14	Average no of sows and gilts (row 13:12)							2,618							
15	Total farrowing sows in one year							5,663							
16	Farrowing index (15:14=farrowing per sow one year)							2.16							
17	Weaned rate per year (weaned piglets : farrowing sows)							10.12							
18	Weaned Piglets per sow per year (16x17)							21.88							
19	Weaned piglets (14x18)							57,288							

Source: Calculations based on the Black Sea Farm internal data

Table 6. Farrowing index 2014

December 2014															
No	Month	Sows and gilts	Insemination number	Insemination rate %	Month	Farrowing sows & gilts	Piglets Birth	Piglets per farrowing sow	Weaned piglets	Total KG Weaned piglets	KG Weight/Piglet Weaned				
	0	1			2	3	4	5=(4:3)	6						
1	Oct-13	2,203	639	77.15%	Jan-14	493	5,391	10.94	4,634	26,414	5.70				
2	Nov-13	2,256	516	89.73%	Feb-14	463	5,086	10.98	4,216	24,240	5.75				
3	Dec-13	2,356	601	71.38%	March 2014	429	4,313	10.05	4,416	26,760	6.06				
4	Jan-14	2,254	505	82.18%	April 2014	415	4,445	10.71	4,456	25,251	5.67				
5	Feb-14	2,172	496	86.69%	May 2014	430	4,329	10.07	3,310	17,662	5.34				
6	Mar-14	2,173	612	65.36%	June 2014	400	4,204	10.51	2,714	14,648	5.40				
7	Apr 2014	2,256	654	64.68%	July 2014	423	4,267	10.09	4,649	30,310	6.52				
8	May 2014	2,401	595	64.37%	Aug-14	383	4,022	10.50	3,095	17,405	5.62				
9	Jun-14	2,495	657	50.23%	Sep-14	330	3,344	10.13	2,868	15,877	5.54				
10	Jul-14	2,256	627	75.28%	Oct-14	472	4,806	10.18	3,743	21,258	5.68				
11	Aug-14	2,404	811	41.55%	Nov-14	337	3,032	9.00	3,401	20,406	6.00				
12	Sep-14	2,495	764	60.99%	Dec-14	466	4,569	9.80	3,816	23,061	6.04				
13	Total one year	27,721	7,477	67.42%	Total 2014	5,041	51,808	10.28	45,318	263,292	5.81				
14	Average no of sows and gilts (row 13:12)							2,310							
15	Total farrowing sows in one year							5,041							
16	Farrowing index (15:14=farrowing per sow one year)							2.18							
17	Rate per year (weaned piglets : farrowing sows)							8.99							
18	Weaned Piglets per sow per year (16x17)							19.62							
19	Weaned piglets (14x18)							45,318							

Source: Calculations based on the Black Sea Farm internal data

Table 7. Piglets birth evolution – January-December 2013-2015

Month	Farrowing - Piglets birth			% 2015/2014
	Year 2013	Year 2014	Year 2015	
January	4,136	5,391	5,232	97.05
February	3,979	5,086	4,968	97.68
March	4,941	4,313	5,778	133.97
April	4,094	4,445	5,642	126.93
May	4,623	4,329	5,815	134.33
June	4,741	4,204	5,377	127.9
July	3,859	4,267	6,016	140.99
August	4,939	4,022	4,991	124.09
September	4,235	3,344	5,000	149.52
October	3,798	4,806	5,305	126.54
November	4,762	3,032	4,376	63.67
December	4,384	4,569	4,958	104.22
Total	52,491	51,808	63,458	98.7

Source: Calculations based on the Black Sea Farm internal data

Table 8. Weaned piglets evolution - January- December 2013-2015

Month	Weaned Piglets			% 2015/2014
	Year 2013	Year 2014	Year 2015	
January	3,414	4,634	3,888	83.9
February	3,215	4,216	4,405	104.48
March	4,670	4,416	4,647	105.23
April	3,931	4,456	6,214	139.45
May	4,490	3,310	4,668	141.03
June	3,549	2,714	4,812	177.3
July	4,077	4,649	6,128	131.81
August	4,253	3,095	3,902	126.07
September	3,990	2,868	5,349	186.51
October	4,838	3,743	4,537	121.21
November	3,590	3,401	4,013	117.99
December	3,657	3,816	4,725	123.82
Total	47,674	45,318	57,288	126.41

Source: Calculations based on the Black Sea Farm internal data

In order to assure profitability at sale, it is very important to keep under control the production costs on the entire flow, starting with minimum production costs for production piglets. [2]

Taking into consideration the experience in breeding herd of production manager, the management has to make the best investment decisions during the flow, for cutting some non productive expenses in order to reduce the production costs, to rise the profitability and to improve the farm performance [3].

Based on our analyse, the main targets for Black Sea Farm to reduce the production costs have to be:

-Farrowing index (piglets per sow per year): at least 2.4

-Non-productive days: maximum 15 days

Financial loss analysis due to mortality in Black Sea Farm

The financial loss in Black Sea Farm due to pig mortality was analysed in our case study in all growing swine phases as follows:

- mortality in maternity;
- mortality in nursery and finishing;
- mortality of sows and gilts.

In order to have an accurate figure of the computation of economic effect of 1% mortality in maternity, we have started our computation from the following figures of 2014 and 2015, presented in detail on a monthly basis above, as follows:

-the average number of piglets farrowed (birth) per year in 2015= 11.21 heads;

-the farrowing index 2015 =2.16 (number of farrowing/sow/year);

-1% x 11.21 piglets x 2.16 = 0.24 piglets in minus weaned per year per sow;

-the average market sales price for a piglet in 2015 was 150 Lei, so it results a loss per sow of 36 Lei (which instead of being loss could be used for feeding a pregnant sow for 12 or 13 days).

Mortality in Maternity

Table 9. Computation of loss in Maternity 2014-2015 due to piglets mortality

No	Explanation	MU	Year 2014	Year 2015
1	Average no of piglets per farrowing saw	No.	10.28	11.21
2	Mortality in maternity	%	11	9.17
3	Farrowing index	No.	2.18	2.16
4	Piglets lost/year/sow due to mortality (1x 2x3)	No.	2.47	2.22
5	Average market sales price for a piglet	lei	120	150
6	Financial Loss per saw per year in Lei (4x5)	lei	296	333
7	Saws for reproduction (Farrowing sows & gilts : farrowing index)	lei	2,310	2,618
8	Total loss in Maternity due to Mortality in Lei (6x7)	thousand lei	683.76	871.79
9	Average yearly exchange rate for 1 €	lei	4,444	4.45
10	Total loss in MATERNITY in Euro (8:9)	€	154	195.91

Source: Calculations based on the Black Sea Farm internal data

The financial loss due to piglets died in maternity, compared with 2014, has a significant increase in 2015 of € 41,909, meaning 27.21%, even the mortality rate in maternity decreased with 1.83%.

The reasons for farm financial loss increasing were:

-Farrowing index was smaller in 2015, with 0.02%;

-Average market sales price for a piglet raised in 2015 with € 6.71;

Table 10. Loss from dead piglets should not get all phases to become fatteners for sale

No	Explanation	MU	Year 2014	Year 2015
1	Weaned piglets lost/year/sow due to mortality	No	2.47	2.22
2	Saws for reproduction	No	2,310	2,618
3	Piglets which should not become fatteners for sale (1x 2)	No	5,705	5,812
4	Mortality rate (Nursery & Finishing) 10% (Max)	No	570	581
5	Fatteners for sale less mortality, if the piglets shouldn't die (3-4)	No	5,135	5,231
6	Average sales price for a fattener of 100 Kg	lei	500	450
7	Revenues not realized from sales due to piglets mortality (5x6)	lei	2,567.5	2,353.95
8	Average yearly exchange rate for 1 €	lei	4.44	4.45
9	Loss in Euro from sales revenues not realized (7:8)	€	578.27	528.98

Source: Calculations based on the Black Sea Farm internal data

Piglets lost in maternity, would not pass all the phases to become fatteners good for sales, so we have computed the economic impact to the value of the sales revenues not realized, or the turnover lost, which was € 578,266 in 2014 and

€ 528,977 in 2015. The main reason for the financial loss increasing in 2015 was due to the decreasing of market sales price for a live pig € 11.23.

Table 11. Financial Loss from APIA financial help lost and not cashed

No	Explanation	MU	Year 2014	Year 2015
1	Fatteners less mortality, if the piglets shouldn't die	capita	5,135	5,231
2	Subsidy per capita	€	28.95	28.95
3	Loss in Euro from subsidy not cashed (1x2)	€	148.66	151.44

Source: Calculations based on the Black Sea Farm internal data

Pigs growing farms receive from Government, an amount of money to cover a part of production cost for each fattener sold, valued € 28.95. It is given by Romanian Agency for Payments and Intervention in Agriculture

(APIA), through a European financing program, measure no.2.1.5.

The financial loss due to piglets died in maternity, which didn't arrive fatteners to be sold was computed talking into consideration

also a mortality rate of 10 % (the maximum percentage).

The value of APIA financial aid which was not cashed, increased in 2015, compared to € 2,779 in 2014, attending a total value of € 151,437.

The total financial loss from maternity (summarized in table 12) was valued at € 876,323 in 2015.

Table 12. Total financial loss from unrealized revenues from maternity

No	Explanation	MU	Year 2014	Year 2015
1	Total loss in Maternity due to Mortality in Euro	Th. €	154	195.91
2	Loss in Euro from sales revenues not realized	Th. €	578.25	528.98
3	Loss in Euro from subsidy not cashed	Th. €	148.66	151.44
4	Total Financial Loss in Maternity (7:8)	Th. €	880.92	876.32

Source: Calculations based on the Black Sea Farm internal data

Mortality in Nursery & Finishing

Table 13. Computation of fodder loss in Nursery & Finishing 2014-2015

No	Explanation	MU	Year 2014	Year 2015
1	Growers & Fatteners - Mortality Heads	kg	4,538	6,734
2	Average weight per dead pig	kg	34.04	29.98
3	Average weight per pig transferred from maternity	kg	5.81	5.67
4	Average gain per dead pig (2-3)	kg	28.23	24.31
5	Fodder consumption per kg gain	kg	3.06	2.98
6	Total fodder consumption per dead pig (4x5)	kg	86.38	72.44
7	No of days for staying in the stable	No.	81	81
8	Price per Kg fodder	lei	0.98	1.01
9	Fodder expenses per dead pig	lei	85	73
10	Total fodder expenses with dead pigs in Lei	lei	381.1	492.7
11	Average yearly exchange rate	lei/€	4.4	4.5
12	Total fodder expenses with dead pigs in Euro	€	85.8	110.7

Source: Calculations based on the Black Sea Farm internal data

Table 14. Financial loss due to Sales Revenues not realized 2014-2015

No	Explanation	MU	Year 2014	Year 2015
1	Growers & Fatteners -Mortality Heads	kg	4,538	6,734
2	Average sales price for a fattener of 100 kg	lei	500	450
3	Total Revenues not realized from sales due to mortality (1x2)	Th. lei	2,269	3,030.3
4	Average yearly exchange rate	lei/€	4.4	4.5
5	Total Revenues not realized due to mortality in Euro (3:4)	€	511.0	681.0

Source: Calculations based on the Black Sea Farm internal data

Table 15. Financial Loss from APIA financial aid lost and not cash

No	Explanation	MU	Year 2014	Year 2015
1	Growers & Fatteners -Mortality Heads	kg	4,538	6,734
2	Subsidy per capita	€	28.95	28.95
3	Loss in Euro from subsidy not cashed (1x2)	Th. €	131.38	194.95

Source: Calculations based on the Black Sea Farm internal data

Table 16. Total financial loss from unrealized revenues and cash inflows nursery & finishing

No	Explanation	MU	Year 2014	Year 2015
1	Fodder loss in Nursery & Finishing	Th. €	86.5	110.7
2	Financial loss due to Sales Revenues not realized	Th. €	511.0	681.0
4	Financial Loss from subsidy lost and not cashed	Th. €	131.4	194.9
5	Total Financial Loss in Nursery & Finishing	Th. €	728.9	986.6

Source: Calculations based on the Black Sea Farm internal data

Table 17. Centralized total financial loss due to mortality in black sea farm

No	Explanation		Year 2014	Year 2015
1	Total Financial Loss due to Mortality in MATERNITY	Th. €	880.924	876.323
2	Total Financial Loss due to Mortality in NURSERY & FINISHING	Th. €	728.93	986.639
3	Total Financial Loss due to Mortality of SOWS & GILTS	Th. €	1,520.14	1,831.84
4	GRAND TOTAL FINANCIAL LOSS DUE TO PIGS MORTALITY (1+2+3)	Th. €	2,401.79	2,708.15

Source: Calculations based on the Black Sea Farm internal data

In 2015 the total financial loss due to mortality is huge, representing € 2,708,154 and was increasing by 13% compared to the previous year.

If we compare the total mortality rate in 2015, which was 6.51% with the mortality rate in 2014 which was 6.44%, the increasing was only of 0.07%, but the financial loss of 13% increasing is influenced by the mortality rates in different phases of growing, such as maternity, nursery and finishing.

CONCLUSIONS

The case study was a great experiment with many observations concerning pig flows, weaning ages, herd sizes, hot nurseries, cold nurseries, wean-to-finish, and a host of the other opportunities or variables associated with pig production.

During our research we have observed that the increasing of mortality rate was due to pigs' disease control, which has been particularly ineffective.

They didn't manage to avoid health crisis, reduce the chronic effects of disease, and maximize productivity. Unfortunately there are no "magic bullets" – no universal vaccine or antibiotic – no single strategy or program. The following is a philosophy more than a recipe to success. Sometimes the problem must be viewed from both high above and close up to find the best choices. Hopefully some of the following ideas will help in the management of both day to day problems and long term health solutions. The need for quality and routine veterinary services is essential for strategic and timely intervention and disease therapy.

Our recommendations for improving the Black Sea Farm's activity and to assure the welfare of pigs compliant with European Council Directive 2008/120/EC are:

- Improving the quality of the flooring surfaces;
- Increasing the living space available for sows and gilts;
- Setting requirements for light and maximum noise levels;
- Providing permanent access to fresh water and to materials for rooting and playing;
- Increased weaning age by setting a minimum weaning age of four weeks;
- Assuring lengthy and proper acclimatization of healthy breeding stock;
- Implementing early gilt development,
- Improving sow farm vaccination programs to increase pig immunity downstream,
- Restricting and controlling movements of people, vehicles and equipment into areas where the pigs are kept;
- Cleaning and disinfecting equipment, vehicles, protective clothing and footwear before and after contact with farm animals;
- Introducing higher level of training and competence on welfare issues for personnel.

A portfolio of professional managers is the gold asset of a pig farm.

Bringing together genetics, facilities and nutrition in a professional way, they achieve maximal performance in a pig farm by minimizing losses due to mortality and morbidity.

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