Pigs, as well as other monogastric species, regulate most of their consumption when feed is supplied in abundance, depending on the necessary energy. With the increase of feed energetic concentration, consumption diminishes when metabolisable energy oscillates only a little. Feed consumption is only a little influenced by feed protein content, as when protein lacks, pigs tend to consume larger amounts of feed to cover the necessary amino acids, and when protein is in excess, there is a slight diminution of feed consumption, which does not influence growth process. When environmental temperature increases, feed consumption diminishes linearly up to the thermal neutrality area, doubled by a diminution of the ingested energy, despite the decrease of the necessary energy level. At low temperatures (below 15°C when kept together), feed consumption increases the lower the temperature.

Key words: swine, feed consumption, semi-intensive system, influence factors

Introduction

Profitability in breeding pigs is determined by the regulation of feed consumption, as in production expenses forage have the largest share, which needs a particular attention in using them with maximum efficiency depending on the animals’ physiological needs (1,2).

Pigs’ needs for nutritious substance vary depending on a series of factors in their turn depending on forage or environmental conditions of exploitation. Though all nutritious elements are important and must be ensured at a proper level, the necessary energy is primordial: this is because the lack of energy affects the most animals’ health and even their lives, because the necessary energy is the most sensitive to environmental conditions (temperature, in particular) and, last but not least, because all the changes in the body are energetic changes.

Separating the necessary energy into maintenance necessary energy and production necessary energy is rather theoretic than physiological, as the cases when there are conditions that meet the maintenance concept, i.e. maintaining the animal’s life at balance, with no weight gain, or fat or protein losses, are rare.
The production necessary energy depends mainly on the composition of the animal produce: for example, the richer the weight-gain in fats (4), the larger the necessary energy is, because fat depositing is more costly (water content is very low). On the contrary, protein synthesis (4), which also involves considerable water deposit (over 70% of the muscles), needs lower energy consumption.

The production necessary energy does not depend on the environmental conditions, as it is related to the genetic patrimony of the animal; in exchange, the necessary energy for maintenance is strictly dependent on the environment. This is why we should mention the necessary energy for maintenance depending on the exploitation system and on the environmental temperature (4).

The necessary protein, minerals, and vitamins in pigs can also be grouped into maintenance necessary and production necessary, but most often it is expressed globally, in relative values (3).

**Materials and Methods**

As a lot of pigs and not to individuals, wine feeding most often refers to we can also talk of a collective necessary derived from the more or less stressed heterogeneity of the animals exploited in a semi-intensive system. In this situation, in order not to increase the necessary for covering the needs of all the animals, we developed a plan of rationalization feed consumption depending on weight and average daily gain both for piglets aged 1st and 2nd age and for fat pigs and, last but not least, for reproduction sows, taking into account the reproductive cycle (gestation and lactation) useful for breeders that prepare their own forage and that wish to be competitive on the ground of regulated feed consumption.

**Results and Discussions**

Though there are several practical ways of feeding piglets aged 1st and 2nd age and fat pigs, choosing a method of regulating feed consumption in pigs exploited in a semi-intensive system depends on the type of the equipment for distributing feed, on the possibility of processing or producing mixed feed or on the availability of farm by-products (whey, potatoes, etc.).

After delivery, piglets have a quite different enzymatic digestive tract from that of adult pigs, being adapted to the digestion of fats, proteins, and lactose. The absence of mobilisable fat tissue results in a sudden energetic malnutrition when there is not enough milk or when temperature is low, followed by hypoglycaemia and death.

Even if milk production in sows is at a proper level, because of the quick development pace in piglets, maternal milk cannot always meet the piglets’ needs and, therefore, other mixed feed must be supplied. This must be done as soon as possible, even from day 7 (despite the low level of consumption, i.e. 3-5 g), using a pre-starter mixed feed that can ensure the energetic level of 3,500 kcal/kg, 20-22% raw protein, amino acids, minerals, and vitamins. Such pre-starter mixed feed are
difficult to produce on the farm; therefore we recommend their purchase because they contain 45-50% grains that are processed (expanding, in maize; roasting, in barley; flaking, in oats). The very high energetic level we recommend is 3,500 kcal/kg while what literature recommends, i.e., 3,800 kcal ED/kg, cannot be ensured without introducing 3-8% vegetal and animal fats (soy oil, animal fat, sunflower oil).

Other usual ingredients are skimmed powder milk and powder whey (20-30%), soy grit (15-20%), fish flour (3-5%), mineral salts (1-2%), vitamin-mineral pre-mixes (0.5-1.0%), synthesis amino acids, some special preparations (enzymes, antibiotics, lactic acid, bio-stimulators).

After weaning and until fattening, piglets get as unique feed source a starter mixed feed with similar composition but with a larger share of grains and, implicitly, with less ingredients of other types that ensure 3,500 kcal ED/kg and 18-19% raw protein.

Table 1 presents a rationalization plan for feed consumption in the piglets of both ages, exploited in a semi-intensive system.

Table 1. Rationalization plan for feed consumption in piglets

<table>
<thead>
<tr>
<th>Age</th>
<th>Weight (kg)</th>
<th>Temperature of the animal (°C)*</th>
<th>Feed (g/day)</th>
<th>Energy (kcal ED/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st age</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 weeks</td>
<td>5.5</td>
<td>26-28</td>
<td>85</td>
<td>300</td>
</tr>
<tr>
<td>4 weeks</td>
<td>6.0</td>
<td>25-26</td>
<td>180</td>
<td>630</td>
</tr>
<tr>
<td>5 weeks</td>
<td>7.6</td>
<td>24-25</td>
<td>330</td>
<td>1150</td>
</tr>
<tr>
<td>2nd age</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.0</td>
<td>23-24</td>
<td>500</td>
<td>1750</td>
<td></td>
</tr>
<tr>
<td>20.0</td>
<td>22-23</td>
<td>1050</td>
<td>3600</td>
<td></td>
</tr>
<tr>
<td>25.0</td>
<td>21-22</td>
<td>1200</td>
<td>4200</td>
<td></td>
</tr>
</tbody>
</table>

*warming with infra-red bulbs put 65-75 cm high depending on age

Feeding fattening piglets should allow a high rate of growth, as little as possible specific consumption, and obtaining quality carcasses; this desideratum can only be reached in semi-intensive exploitation, so that we should get to a harmonious compromise on the ground of economic and market criteria.

At the end of fattening castrated boars we recommend to diminish energetic value to limit fat depositions which results in a decrease of average daily gain and of profit for breeders; this is why we recommend the use of commercial mixed feed or the production of feed on the farm, using two types of forage:
- grower, from 25 to 60 kg;
- finisher, from 60 to 100 kg.

Such feed should have 3,200-3,300 kcal ED/kg in both fattening steps, and 15-16% raw protein in the 1st fattening stage and 13-14% raw protein in the 2nd fattening stage. The distribution of feed can be done either as dry matter or – this is what we recommend – moist matter: 1 l of water per 1 kg of mixed feed in the 1
stage and 1 l of water per 1.5 kg of mixed feed in the 2nd stage provided there are equipments to prepare it on the farm.

Average amount of mixed feed eaten by a pig 25-100 kg of weight is 250 kg, i.e. an average daily consumption of 1.9 kg and a specific consumption of 3.3 kg per 1 kg of weight gain, which is reasonable for the semi-intensive exploitation system.

In case weaning occurs at the age of 6 weeks – the usual timing on farms – piglets eat 0.5 kg of mixed feed per day reaching 3.5 kg of mixed feed per day while weighing 100 kg, we get a monthly progression of mixed feed of 0.5 kg per capita. On the ground of these calculus that can be modified when using hybrids from genetic farms and giving up tri-hybrids of Landrace, Marele Alb, Duroc, and Hampshire we can anticipate weight gains per growth stages such as those we present in Table 2.

Swine production parameters from birth to slaughter

<table>
<thead>
<tr>
<th>Specification</th>
<th>Period</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Up to the weaning</td>
<td>Growth</td>
<td>Fattening</td>
</tr>
<tr>
<td>Age per stages (days)</td>
<td>35</td>
<td>42</td>
<td>133</td>
</tr>
<tr>
<td>Age at the end of the stages</td>
<td>35</td>
<td>77</td>
<td>210</td>
</tr>
<tr>
<td>Weight at the end of the stages (kg)</td>
<td>10</td>
<td>25</td>
<td>110</td>
</tr>
<tr>
<td>Average daily gain per stages (g)</td>
<td>285</td>
<td>355</td>
<td>640</td>
</tr>
<tr>
<td>Average daily gain at the end of the stages (g)</td>
<td>285</td>
<td>325</td>
<td>525</td>
</tr>
</tbody>
</table>

If the breeder owns the proper equipment, the arable land on which to produce basic raw matter for mixed feed (grains, protein and oil vegetables), he can produce his own feed provided he buys the rest of the ingredients. In this context, we can produce maize and soy feed which doubled by some concentrates with proteins, vitamins, and minerals.

On less performing pig fattening farms in a semi-intensive system pigs can be fed with mixtures of concentrates (2-3 energetic and protein concentrates) and some mass feed (alfalfa, potatoes, beets, pumpkins), when they are bred on summer camps with improvised sheds.

Fattening pigs weighing 45 kg alive and bred in a semi-intensive system at temperatures of 16°C put on 716 g for a consumption of 3.20 kg feed per day while at a temperature of 10°C, they put on only 621 g for a specific consumption of 4.10 kg (5).

In most cases, if we eliminate all risk of sanitary problems on semi-intensive pig farms, piglets get as much feed as they need after weaning. But if there is any risk of digestive situations, we need to regulate the feed consumption progression.
The performances that can be reached when putting into practice such a restrictive feeding programme are shown in Table 3.

Table 3. Performances expected when using a rationalization plan of pig feed while growing and fattening

<table>
<thead>
<tr>
<th>Piglets</th>
<th>1\textsuperscript{st} age</th>
<th>2\textsuperscript{nd} age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average daily gain (g)</td>
<td>200-250</td>
<td>500-550</td>
</tr>
<tr>
<td>Specific consumption (kg of feed) per kg of gain</td>
<td>1.40</td>
<td>1.65</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fattening pigs</th>
<th>Females</th>
<th>Males</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average daily gain (g)</td>
<td>700-750</td>
<td>650-700</td>
</tr>
<tr>
<td>Specific consumption (kg of feed) per kg of gain</td>
<td>3.0-3.2</td>
<td>3.2-3.4</td>
</tr>
</tbody>
</table>

Feeding sows can be properly done only if we take into account the whole production cycle (gestation + lactation). From an insemination to another, we can see in sows an increase or a decrease of body weight (Figure 1) as a result of several phenomena:

- an increase in weight during gestation;
- a sudden decrease in weight immediately after delivery;
- a regulate loss of weight during lactation.

As a result, an energetic level of 8,000 kcal ED/day during gestation allows a net gain of 45 kg (figures are orientative because even a net gestation gain of 30 kg for the Marele Alb x Landrace hybrid is compatible with good performance).

The supply of 8,000 kcal ED/day can be ensured by 2.5-2.7 kg of mixed feed with energetic concentration of 3,000 kcal ED/day.

As the necessary energy in pregnant sows is relatively low we can feed them low ratios during this physiological period energetically. In order to diminish energy to 2,800 kcal ED/kg of mixed feed (6) we recommend the inclusion of some forage such as wheat husks and dehydrated beet root pulp with favourable consequences on sows’ behaviour and even on later reproductive cycles.

During lactation, as a result of limited ingestion, sows take from their body reserves accumulated during gestation, loosing 25.5 kg. We recommend that lactating sows be fed according to needs, by feeding them feed with an energetic concentration of 3,000-3,200 kcal/kg; thus, for a necessary 17,000 kcal ED/kg, a feed with 3,100 kcal ED/kg must be eaten in amounts of 5.5 kg/day, allowing sows to get the necessary feed for maintenance and milk production. Maximum consumption for a sow of 200 kg with 10 piglets is 7 kg of mixed feed/day (1 kg/100 kg of weight live and 0.5 kg/suckling piglet). For primiparous sows, we recommend for the 1\textsuperscript{st} cycle the use of some high-protein content mixed feed (17%) and 0.75% lysine with favourable effects on growth rate in lactating sows.
Figure 1. Evolution of average weight in sows during a production cycle (8,000 kcal ED/day, energetic level during gestation)

**Conclusions**

The higher the energetic concentration of the feed, the lower the amount of feed for pigs through metabolic regulation is, protein consumption having a lesser impact.

In certain situations, daily consumption must be regulated voluntarily, at a pre-determined level in the case of digestive situations in weaned piglets or in pregnant sows to improve fertility and, last but not least, in fattening pigs during the 2nd stage of the fattening in order to limit fat depositions.

The recommended average amount of mixed feed for a pig weighing 25-100 kg is 250 kg, i.e. a consumption of 1.9 kg/day during the 19 weeks of fattening and a specific consumption of 3.3 kg which, for the semi-intensive breeding system, is considered to be reasonable.

Expected performance in using a rationalizing plan of pig feed during growth and fattenning ranges, from the point of view of the average daily gain, between 200 and 550 g for the piglets; in fattening pigs it ranges between 600 and 750 g.
depending on the sex. Specific consumptions vary in piglets between 1.4 and 1.65 kg per kg of gain, and in fat pigs from 3.0 to 3.4 kg per kg of gain.

Bibliography


**FACTORII DE IMPACT ÎN REGLAREA CONSUMULUI DE HRANĂ LA PORCII EXPLOATAȚI ÎN SISTEM SEMI-INTENSIV**

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Porcii ca și alte specii de monogastrici își reglează în cea mai mare măsură consumul, atunci când hrana este administrată la discreție, în funcție de acoperirea necesarului de energie. Odată cu creșterea concentrației energetice a hranei, consumul se reduce, în condițiile în care energia metabolizabilă (EM) oscilează foarte puțin. Consumul de hrană este influențat doar în mică măsură și de conținutul în proteină a hranei, în cazul unor rare ții care trebuie să consume cantități mai mari de hrană pentru a-și acoperi necesarul de aminoacizi, iar în cazul unor excedente de proteină se constată, dimpotrivă, o reducere a consumului de hrană, fără însă a influența procesul de creștere. La creșterea temperaturii mediului, consumul de hrană scade liniar până către zona de neutralitate termică, antrenând o reducere a energiei ingerate, în ciuda scăderii necesarului energetic de întreținere. La temperaturi scăzute ale mediului (sub 15°C la cazarea în grup, consumul de hrană crește cu cât temperatura este mai scăzută).

Cuvinte cheie: porcine, consum de hrană, sistem semiintensiv, factori de influență.