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# Relationships between ovulation rate and litter size in purebred Landrace and Yorkshire gilts

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**Abstract**

The aim of the present study was to investigate the ovulation rate and its relationship to number of total piglets born in purebred gilts under tropical climatic conditions. This study was conducted in two swine breeding herds (A and B) in the northeastern part of Thailand. The sources of swine genetic material originate from West Europe. Gilts were mated (AI) on the second or later observed estrus at a body weight of at least 130 kg. In most cases, they were mated at third estrus. One hundred and twenty-seven gilts, 24 Landrace and 24 Yorkshire from herd A, and 42 Landrace and 37 Yorkshire from herd B were used. Gilts were examined once by laparoscopy under general anesthesia between days 8 and 15 after mating. The ovaries were examined and the pathological findings were recorded. The number of corpora lutea was counted, and was assumed to equal the ovulation rate. Subsequent mating results and farrowing data were recorded. The data were analyzed with analysis of variance. Single or double unilateral cysts and par-ovarian cysts did not affect mating results. Landrace gilts were significantly younger at first mating than Yorkshire gilts (244 versus 249 days, $P < 0.05$). At first mating, Yorkshire gilts had a significantly higher ovulation rate compared to Landrace gilts (15.3 versus 13.8, $P < 0.001$). There was no difference in the number of total piglets born per litter between the two breeds, but the total prenatal loss from ovulation to farrowing was significantly higher in Yorkshire than in Landrace gilts. Both the low ovulation rate and the high prenatal loss contribute to the low litter size in gilts raised under tropical climatic conditions.


*Keywords:* Ovulation rate; Prenatal loss; Litter size; Purebred gilts

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## 1. Introduction

The reproductive efficiency of gilts and sows in tropical areas, such as Thailand, [1,2] is lower than in temperate areas (e.g. [3]). The sources of swine genetic material in Thailand generally originate from temperate and subtropical areas, i.e. countries in the Western part of Europe and North America, where the climate is quite different from that in Thailand. It has been demonstrated that the climatic conditions of high temperature and humidity contribute to the lower reproductive efficiency, particularly, the lower litter size at birth [2].

Litter size is determined by ovulation rate, fertilization rate and prenatal survival rate [4]. Ovulation rate defines the upper limit of litter size [5]. Litter size can be in some degree improved by genetic selection [6–9]. The ovulation rate in purebred sows under tropical climatic conditions was found to be lower in Landrace sows than in Yorkshire sows [10]. Unfortunately, the subsequent farrowing data was not available and prenatal loss could therefore not be calculated. The relationship between ovulation rate and the litter size of sows in this area has not been elucidated.

To our knowledge, the ovulation rate and prenatal loss from ovulation to farrowing in purebred Landrace and Yorkshire gilts under tropical conditions with high ambient temperature and high humidity has not yet been reported.

The aim of the present study was to investigate ovulation rate and its relationship with number of total piglets born in purebred Landrace and Yorkshire gilts under tropical climatic conditions.

## 2. Materials and methods

### 2.1. Farms and management

This study was conducted at two swine breeding herds (A and B) in the northeastern part of Thailand. The average daily 24 h temperature was 29.2 °C, and the average daily peak temperature was 33.8 °C. These two herds belong to the same breeding company and are located 20 km apart from each other. The herds had both purebred Landrace (L) and Yorkshire (Y) sows, and produced crossbred offspring (L × Y and Y × L). The management and the health program in herds A and B, as well as in the nucleus herds in Thailand are the same as was recommended by the breeding company in Europe, which supplied the genetic materials for the nucleus herds. The nucleus herds in Thailand are located separately from herds A and B. The gilts and sows were housed in open buildings, and were kept in groups of four for estrus stimulation and in individual stalls during gestation, whereas lactation sows were kept in individual farrowing pens. During the growth period, gilts were fed a diet based on corn, broken rice, rice bran, soybean meal and fish meal containing 16% CP and 3.2 Mcal of DE/kg. The feed allowance progressively increased from 2 kg/day to 2.5 kg/day. At 23 weeks of age, the gilts were moved to the breeding unit, where the vaccinations were performed. Gilts were mated (AI) on the second or later observed estrus at a body weight of at least 130 kg. In most cases, they were mated at their third estrus. Landrace gilts were inseminated twice with proven Yorkshire boar semen and Yorkshire gilts were inseminated twice with proven Landrace boar semen. Hormonal