
Monitoring of osteochondrosis in pig selection

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The syndrome of leg weakness directly related to osteochondrosis has become quite widespread in pig husbandry. The problem has become acute, because, from the point of view of exterior, long and muscular pigs are being raised. Osteochondrosis is a hereditary degenerative joint disease of bone and cartilage tissues, leading to leg weakness in pigs. The heritability coefficient of leg weakness defect varies from 0.2 to 0.6 for different pig breeds.

The monitoring of pig osteochondrosis in Lithuania was started in 2001 when 1009 pigs of various genotypes and with an average weight 100 kg were tested. The pigs were selected at a fattening control station, slaughtered, and osteochondrosis was measured according to the methods applied in Sweden by the cut surface of distal femur and humerus. The severity of this disease was scored in elbow and knee joints on a 0–5 point scale. The occurrence of osteochondrosis among all the pigs of various breeds made up 48.1%. Lithuanian White pigs were least affected by joints osteochondrosis (32.7% of pigs), while osteochondrotic lesions were registered in 78.7% of crossbreds out of imported breeds. The study indicated that castrated males were more inclined than gilts to leg weakness syndrome (51.6% vs. 44.5%). Front legs were more affected by joint lesions. The obtained data indicated that osteochondrosis should be controlled in the course of selection of pigs bred in Lithuania.

Key words: pig osteochondrosis, pig breeding

INTRODUCTION

Osteochondrosis is a hereditary disease of bone and cartilage tissues that deforms joints and reduces the strength of legs. As a consequence, pigs start limping and cannot walk properly [1]. These symptoms are especially visible in adult (over 100 kg weight) pigs [2, 3], and losses in both pedigree and commercial pig breeding are significant. Osteochondrosis can be recorded in various joints, but its severity can be different. The incidence of osteochondrosis in animals is highest in the distal femur and humerus [4]. This is the main disease of pig skeleton, characterized by deranged formation of bones and retention of cartilage on the joint surface. As the raising of long and muscular pigs is widespread, the above-mentioned defect requires increasing attention. A review of Swedish and Danish literature indicates that there is a positive correlation between length and muscularity of the pig body and osteochondrosis [5, 6]. Besides, this disease is more frequent in pigs of weaker constitution [4].

No data have been found on which chromosome has the gene of osteochondrosis. The coefficient for heritability of leg weakness in pigs of different breeds ranged from 0.2 to 0.6 [1, 7]. It has been reported

that Landrace pigs are more inclined to osteochondrosis than Yorkshire, Hampshire or Duroc pigs [3, 7]. It should be noted that knee joints of boars are more often affected by osteochondrosis than those of gilts [5, 7].

As the defect is hereditary, it should be controlled in the course of selection. Studies of osteochondrosis are carried out in Sweden, Denmark, Finland, Germany, Holland, the USA and other countries. Pigs raised in fattening test stations in Sweden are checked for osteochondrosis after slaughter on a 0–5 point scale [2, 6]. Front and hind legs are checked. If elbow and knee joint lesions are determined for the progeny, their parents can be further used for breeding provided their performance is very high and no significant gait derangements are visible. In Sweden, checking osteochondrosis in pigs is one of the obligatory criteria for BLUP evaluation of breeding pigs. In Denmark and Finland, at test stations osteochondrosis is measured in live pigs by the radiography method and evaluated on a 1–5 point scale [3, 5]. If osteochondrotic lesions of joints have been found, the progeny is culled and not used for breeding. In Holland and the USA, leg weakness syndrome in pigs is evaluated on a 1–9 point scale by the so-called mixed threshold model [8]. Feeding and housing conditions (floor type, humidity, etc.)

have an influence on the more intensive development of osteochondrosis in pigs susceptible to this disease [9, 10].

Thus, studies of hereditary factors are important for improvement of pig performance and health. So far, studies of pig osteochondrosis have not been carried out in Lithuania.

The purpose of this study was to analyse the distribution of osteochondrosis in pigs bred in Lithuania.

MATERIALS AND METHODS

Pigs of various breeds chosen from different breeding centres and raised (from 30 to approx. 100 kg

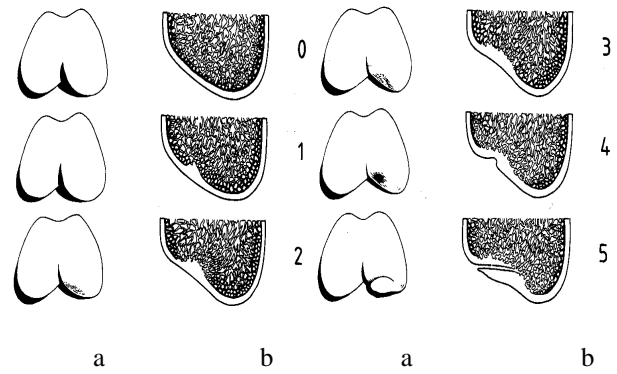


Figure. Distal view of femoral and humeral condyles (a) and its cut surface (b)

Table 1. Occurrence of osteochondrosis among pigs bred in Lithuania

Sex	No of pigs	Normal joints (0 score)		Joint lesions		Score							
						elbow joint			knee joint			both joints	
						1	2	3-5	1	2	3-5	1-2	3-5
No.	%	No.	%	No.	No.	No.	No.	No.	No.	No.	No.	No.	
Lithuanian White (LW)													
Gilts	132	94	71.2	38	28.8	6	1	–	22	7	–	2	–
Castrates	113	71	62.8	42	37.2	28	7	–	7	–	–	–	–
Total	245	165	67.3	80	32.7	34	8	–	29	7	–	2	–
Lithuanian White bacon type (LW-B1)													
Gilts	18	8	44.4	10	55.6	5	–	–	3	–	–	2	–
Castrates	16	8	50.0	8	50.0	4	–	–	2	–	–	2	–
Total	34	16	47.1	18	52.9	9	–	–	5	–	–	4	–
Lithuanian White meat type (LW-M1)													
Gilts	5	2	40.0	3	60.0	–	–	–	1	–	–	2	–
Castrates	6	3	50.0	3	50.0	1	–	–	2	–	–	–	–
Total	11	5	45.5	6	54.5	1	–	–	3	–	–	2	–
Swedish Yorkshire (SY)													
Gilts	83	44	53.0	39	47.0	10	1	–	17	–	–	11	–
Castrates	102	52	51.0	50	49.0	18	1	–	13	3	–	15	–
Total	185	96	51.9	89	48.1	28	2	–	30	3	–	26	–
German Landrace (GL)													
Gilts	22	13	59.1	9	40.9	5	–	–	2	–	–	2	–
Castrates	19	8	42.1	11	57.9	5	–	–	6	–	–	–	–
Total	41	21	51.2	20	48.8	10	–	–	8	–	–	2	–
Danish Landrace (DL)													
Gilts	6	3	50.0	3	50.0	2	–	–	–	–	–	1	–
Castrates	5	2	40.0	3	60.0	1	–	–	–	1	–	1	–
Total	11	5	45.5	6	54.5	3	–	–	–	1	–	2	–
Crossbreds from Lithuanian White and imported breeds (LWxSY, LWxDY, LWxGL, LWxGLxDL, LWxNL, LWxNLxNY, LWxDL, LWxDLxD, LWxDYxDL, LWxD)*													
Gilts	175	97	55.4	78	44.6	18	19	2	16	2	–	21	–
Castrates	180	92	51.1	88	48.9	16	5	–	14	5	2	46	–
Total	355	189	53.2	166	46.8	34	24	2	30	7	2	67	–
Crossbreds from imported breeds (NLxNY, NLxSY, NLxDL, NLxD, GLxNL, GLxD, GLxSYxD, SYxD, DYxDL, DLxDY, DLxD)*													
Gilts	60	17	28.3	43	71.7	15	5	1	9	2	–	11	–
Castrates	67	10	14.9	57	85.1	29	4	–	7	1	1	15	–
Total	127	27	21.3	100	78.7	44	9	1	16	3	1	26	–
All breeds													
Gilts	501	278	55.5	223	44.5	61	26	3	70	11	–	52	–
Castrates	508	246	48.4	262	51.6	102	17	–	51	10	3	79	–
Total	1009	524	51.9	485	48.1	163	43	3	121	21	3	131	–

*Other abbreviations: DY – Danish Yorkshire; NY – Norwegian Yorkshire; NL – Norwegian Landrace; D – Duroc.

weight) at the control fattening test station in Baisogala were checked for osteochondrosis. Feeding and housing conditions were the same for all pigs. The pigs were slaughtered at meat-processing plants, and osteochondrosis was measured according to the methods applied in Sweden by the cut surface of distal femur and humerus. The severity of this disease was scored in elbow and knee joints on a 0–5 point scale (Figure). The scores range from 0 (no joint lesions) to 5 (severe joint lesions), with 1 indicating week joint lesions. In 2001, 1009 pigs of various genotypes, including 501 gilts and 508 castrates, were tested. Osteochondrosis was analysed in relation to the breed and sex of the pig.

RESULTS AND DISCUSSION

The occurrence of osteochondrosis among all the pigs of various breeds tested accounted for 48.1% (Table). Lithuanian White pigs were least affected by osteochondrosis in the joints (32.7% of pigs), while osteochondrotic lesions were registered in 78.7% of crossbreds out of imported breeds. More or less severe osteochondrotic lesions in pigs have been found in all the breeding centres. Crossbreeding of Lithuanian White pigs with the boars of imported breeds had a negative effect on the leg weakness of the progeny. The occurrence of osteochondrosis among the crossbred progeny was by 14.9% higher as compared to that of purebred Lithuanian Whites. The study indicated that castrated males were more inclined than gilts to have leg weakness syndrome (51.6% vs. 44.5%). This tendency has been ascertained in the groups of purebred Lithuanian White, Swedish Yorkshire, German Landrace, Danish Landrace and crossbred pigs (Table).

Mild osteochondrosis (one point) incidence has been determined in the joints of front and hind legs of most pigs. The severity of osteochondrotic lesions in 4 Lithuanian White × Norwegian Landrace and 2 Norwegian Landrace × Danish Landrace crossbred pigs amounted to 3 points. The positive correlation (r) between osteochondrotic lesions in elbow and knee joints ranged from +0.02 to +0.5. Front legs were more often affected by joint lesions.

CONCLUSIONS

The investigation data indicated that osteochondrosis should be controlled in the course of selection of pigs bred in Lithuania. As we have no special X-ray apparatus, the most acceptable way to currently study osteochondrosis should be based on the methods applied in Sweden. If osteochondrotic joint lesions have been determined for the slaughtered progeny, their parents raised at the breeding cen-

tres should be observed. Boars and sows with the traits of leg weakness that (according to the progeny tests) may be related to osteochondrosis should not be left for further breeding.

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A. Klimienė, R. Klimas

OSTEOCHONDROZĖS MONITORINGAS KIAULIŲ SELEKCIJOJE

S a n t r a u k a

Auginant ilgas ir raumeningas kiaules, pradėjo plisti kojų silpnumo sindromas, kuris tiesiogiai susijęs su osteochondroze. Tai kaulinio ir kremzlinio audinio liga, deformuojanti sąnarius, todėl sumažėja galūnių (kojų) tvirtumas, kiaulės pradeda šlubuoti, nepaeina. Įvairių veislių kiaulių kojų silpnumo ydos paveldimumo koeficientas svyruoja nuo 0,2 iki 0,6. Vykdamas kiaulių selekciją produktyvumo bei sveikatingumo gerinimo kryptimi, vis aktualesni tampa paveldimų veiksnių tyrimai. Lietuvoje veisiamų kiaulių osteochondrozės tyrimai pradėti 2001 metais. Ištirta 1009 įvairaus genotipo kiaulės, atrinktos iš skirtingų šalies veislių ir užaugintos (nuo 30 iki vidutiniškai 100 kg svorio) kontrolinio penėjimo stotyje. Paskerdus kiaules, osteochondrozė nustatyta pagal Švedijoje priimtą metodiką, t. y. atliekant petikaulio ir šlaunikaulio distalinio paviršiaus pjūvį. Šios ydos stiprumas alkūnės ir kelio sąnariuose vertintas pagal 0–5 balų skalę.

Osteochondrozės paplitimas tarp ištirtų Lietuvoje auginamų veislių kiaulių sudarė 48,1%. Mažiausiai osteochondrozės pažeisti kojų sąnariai buvo grynaveislių Lietuvos baltųjų (32,7%) daugiausiai – importuotų veislių mišrūnų (78,7%). Nustatyta, jog kastruoti kuiliukai turi didesnę polinkį kojų silpnumo sindromui, susijusiam su osteochondroze, (51,6%) negu kiaulaitės (44,5%). Dažnesnis sąnarių pažeidimas nustatytas priekinėse kojose. Tyrimų duomenimis, osteochondrozė turėtų būti kontroliuojama selekcijos metu ir tarp šalyje veisiamų kiaulių.

Raktažodžiai: osteochondrozė, kiaulių veislės, selekcija