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Hunting potential of the pointing dogs based on the junior hunting tests in Poland

Elzbieta Bednarek, Anna Slawinska*

Katedra Biotechnologii i Genetyki Zwierząt - Poland

Abstract: Junior hunting tests evaluate the innate predispositions of the young dogs for hunting. Junior pointing dogs (<2 years old) are evaluated in six competitions: scent, pointing, searching, speed, swimming and obedience. The aim of this study was to analyse the influence of selected factors on performance of the young individuals. Analysis was based on the results of the junior hunting tests of the pointing dog collected over years 2007-2015 by the Polish Hunting Association. The database included 2107 individuals belonging to 26 breeds, such as German shorthaired pointer, Weimaraner, Irish setter, German wirehaired pointer, and Gordon setter. A nonparametric analysis of variance was performed to determine impact of age, sex and breed on dogs' performance. Spearman's correlation was carried out to estimate associations between traits. Breed influenced ($P < 0.01$) the total score as well as individual categories. The best performing pointing dogs were German shorthaired (87.74 points) and wirehaired pointer (86.78 points). The poorest results were achieved by English (64.23 points) and Irish setters (69.82 points). Sex affected the total score, speed ($P<0.05$) and swimming ($P<0.01$); the dogs performed better than bitches. Age did not have a significant impact on the results ($P>0.05$) except from swimming ($P <0.01$); older dogs produced higher scores. The most correlated categories were scent and pointing (0.754) as well as searching and speed (0.750). The data characterize the current status of the hunting potential of different breeds of pointing dogs in Poland and can be used as a tool in further breeding and training programs.

Key Words: gun dog, working dog, pointer, setter, hunting association.

* *Corresponding Author*: Anna Slawinska, email: slawinska@utp.edu.pl

Introduction

Pointing dogs are specifically used for pointing and retrieving game during hunting. Their particular tasks include detection of birds, capture of birds, detection of scat, capture of mammals and detection of reptiles (Dahlgren et al., 2012). Based on official classification by International Cynology Federation (FCI), the group VII of pointing dogs contains 37 breeds. Different breeds of pointing dogs are divided into the British Isles (Pointer, Irish setter, English setter and Gordon setter) and the continental pointing dogs (German shorthaired pointer and wirehaired, Weimaraner, Hungarian vizsla, Small münsterländer, Brittany spaniel and Cesky fousek) (Monkiewicz & Wajdzik, 2003). The British Isles pointing dogs use the air scent, and the continental dogs use the ground scent. A characteristic feature of all the pointing dogs is assuming and holding a classical pointing position to show the location of the game to the hunter (Ciemniewski, 2013). The genetic improvement of the pointing dogs has resulted in extending their abilities and environments where they can effectively hunt. Contemporary pointing dogs can hunt not only in the fields, but also in the water (multilateral hunting/pointing dogs) and in the forest (versatile hunting/pointing dogs) (Brabletz, 2015).

Hunting in Poland has a long tradition and is a popular activity, due to extensive forest areas

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inhabited by different wildlife species (Gawin et al., 2015). The wild game population is managed by the Polish Hunting Association (PHA), which currently associates over 120 thousands of registered hunters. Hunting is allowed within over 4'698 hunting districts covering the area of 25'700.8k ha across the country. Many of those hunting areas are inhabited by feathered game, including pheasants (in 2016, 128k heads were shot) and partridges (in 2016, 2.7k heads were shot), which are hunted for using different breeds of hunting dogs. (Central Statistical Office, 2016)

Hunting potential and effects of training of the hunting dogs is also supervised by the PHA. To provide evaluation of the hunting dogs, PHA regularly organizes junior and senior hunting tests. Dogs are assigned to the hunting test based on their type and age. Junior hunting tests for pointing dogs is organised for young individuals of different breeds, from 9 to 24 months of age. Evaluating young dogs, prior to any hunting training, allows for determining their full hunting potential. The assessment of the hunting potential of the pointing dogs includes reaction to the shot, ability to catch and follow the scent, independence in hunting, pointing ability, obedience and reaction to the water. After passing the junior hunting test the dog can start the hunting training and obtain full breeding rights (PHA).

The literature on the pointing dogs is scarce and mainly related to their genetics or behaviour. Parra et al. (2008) compared five breeds of the Spanish pointing dogs and demonstrated high between-breed genetic diversity. Such high genetic diversity was most likely due to the genetically distinct individuals who shared a common ancestor, i.e., English setter with English pointer and German shorthaired pointer. Homozygosity mapping between pointing and herding dogs revealed that the pointing behaviour is most likely encoded by two polymorphisms on chromosome 22 (Akkad et al., 2015). Karlskov-Mortensen et al. (2019) identified a mutation responsible for blindness in Old Danish pointing dog, which leads us closer to understanding of the genetics of the pointing dogs. Behavioural research indicate that the pointing dogs belong to the least aggressive breeds (Stafford, 1996). Serpell & Duffy (2014) demonstrated that the German shorthaired pointer was not only the least aggressive breed, but also the least fearful. Pointing dogs, which are classified as sporting dogs, were evaluated as highly trainable, especially in comparison to non-sporting dogs (Turcsán et al., 2011). Arvelius & Klemetsdal (2013) developed a statistical model that allows for enhancing the potential for training English setter by breeding towards utility in cooperative hunting.

In this study, we aim to evaluate performance of the young pointing dogs in junior hunting tests, which are carried out for individuals prior to their training in hunting. Due to the increasingly frequent use of hunting dogs as companion dogs at work, we hypothesized that the hunting instinct in the pointing dogs could be disturbed. We also aim to determine, which breeds of pointing dogs express the highest hunting potential and whether we can pinpoint the demographic tendencies in the evaluated traits.

Materials and methods

Junior hunting tests and data collection

The dataset included results of the junior hunting test organized in Poland in 2007-2015 for the total number of 2107 pointing dogs. The major goal of the junior hunting tests is to evaluate hunting potential of the pointing dogs. For this reason, the animals must be young (9-24 months old) and without any prior hunting training. The data were derived from the "Catalogue of Junior and Senior Hunting tests", which is issued by the Polish Hunting Association (PHA). The individuals included in the junior hunting tests for pointing dogs must have been registered in the Polish Kennel Club. All the registered young dogs in the Polish Kennel Club must come from parents which have pedigrees and have birth certificate. The competitions were evaluated

by a committee consisting of judges registered in the Polish Kennel Club.

A junior hunting test for pointing dogs consists of six competitions: scent, pointing, searching, speed, swimming and obedience. Description of the junior hunting test and scoring criteria was included in Table 1. Junior hunting test begins with the dog's reaction to the gunshot (anxious dogs are excluded). The scoring scale ranges from 0 (the lowest note) to 4 (the highest note). Each score is multiplied by the weight corresponding to the difficulty of the given competition. The final result includes the sum of scores from the individual competitions. The dataset includes the following characteristics for each dog: name and surname of breeding dog, breed, sex, birth date, PKR number (number from Polish Pedigree Book) and name and surname of the owner. Weather and environmental conditions are not included in the scoring algorithm. Upon completing all competitions included in the hunting test, the dogs are ranked the certificates are issued.

Table 1. List of competition for the junior hunting test of the pointing dog

Trait	Score	Weight	Description
Scent	0-4	5	The dog should catch and follow the scent of the game
Pointing	0-4	5	The dog should freeze in a pointing position characteristic to a given breed
Searching	0-4	4	The dog should move in wide and zigzag pattern to follow the scent of the game
Speed	0-4	4	The dog should move characteristically for the given breed and as quickly as possible
Swimming	0-4	4	The dog should enter the water and swim about 5 m in 10 minutes (it is allowed to throw pebbles into the water to encourage the dog to enter the water)
Obedience	0-4	3	The dog should be willing to follow the instructions and keep in touch with the guide

The dataset was organized as follows: each dog was included in one age group only once. For dogs repeatedly involved in the junior hunting test, average results for the given year were used in statistical analyses. The animals were divided into four age groups: I (9-12 months old, 220 dogs), II (13-17 months old, 355 dogs), III (18-22 months old, 244 dogs) and IV (23-24 months old, 1288 dogs). The breed factor was analysed in case of groups > 50 individuals. The dataset contained categorical data, and therefore non-parametric statistical tests were used. The impact of sex, age and breed was analysed with non-parametric analysis of variations (NPANOVA). Differences between the groups were determined with the Mann-Whitney U test (for sex) or Kruskal-Wallis test (for age and breed). The correlation between competitions was estimated on the basis of Spearman's correlation coefficient. The calculations were made in the SAS statistical package (SAS Institute Inc, Cary, NC, USA) and Medcalc (MedCalc Software, Ostend, Belgium).

Results and discussion

Dog breeds

Analysis of the junior hunting test data was carried out for 2107 dogs belonging to 26 breeds. Figure 1 shows the distribution of the breeds involved in the junior hunting test for the pointing dogs. The most numerous breeds were: German shorthaired pointer (464 individuals), Irish setter

(348 individuals), and Weimaraner (323 individuals). More than half of the breeds (15 out of 26), including Large munsterlander, Wirehaired pointing griffon, Perdigueiro português, Braque saint-germain, and Slovak rough haired, were underrepresented (< 50 individuals). Those breeds were excluded from analysis of variance in which breed was a fixed factor. Dataset that allowed analysis of a breed effect comprised of 2012 individuals from 11 breeds. The distribution of the number of dogs in the given breeds participating in the junior hunting test of pointing dogs reflects the population of dogs registered in the Kennel Club in Poland. The most popular breed of all analysed in Poland is the German shorthaired pointer, which in 2015 had a population of 450 individuals, and the least popular breed was Brittany spaniel, 51 individuals (The Polish Kennel Club, 2017).

Figure 1. Distribution of the breeds involved in the junior hunting test for the pointing dogs.

Descriptive statistics

Descriptive statistics and the analysis of variance are presented in Table 2. The maximum achievable total score was 100, whereas the average total score obtained in this study was 79.38. The category that scored the highest mean was obedience (3.72), which was close to maximum value of 4 points. The lowest score was obtained for pointing (2.82). The total score reflected partial scores obtained by a given dog in each competition. Based on the literature, many factors influence the dog's hunting abilities, including the origin, relationship between the dog and the keeper and a balanced diet. Heritability of the hunting characteristics is varied. For example, the inheritance of obedience is very low and amounted to 0.02 in the Norwegian elkhound (Liinamo et al., 1997) and 0.04 in Norwegian elkhound grey (Wetten & Aasmundstan, 2014). The inheritance of pointing amounted to 0.25 in the German shorthaired pointer and 0.13 in the German wirehaired pointer (Schmutz & Schmutz, 2015). Karpiński et al. (2009) showed the influence of the maintenance method on adaptive intelligence. Dogs kept at home achieved higher Corena test results than dogs kept in the pen. Differences indicate that the dog's intelligence is also influenced by the relationship with the keeper (Karpiński et al., 2009). The effect of diet on the condition and endurance of the English pointing dogs during the hunting season was found (Davenport et al., 2001).

Table 2. Descriptive statistics and variance analysis of the junior hunting test for pointing dogs.

Value	N	Total Score	Scent	Pointing	Searching	Speed	Swimming	Obedience
Mean	2107	79.17	3.05	2.81	3.29	3.33	3.08	3.72
Min	2107	0	0	0	0	0	0	0
Max	2107	100	4	4	4	4	4	4
p-value								
Sex	2107	*	ns	ns	ns	*	**	ns
Age group	2107	ns	ns	ns	ns	ns	**	ns
Breed	2012	**	**	**	**	**	**	**

Differences between age groups and breed were examined using the Kruskal-Wallis test and between the sexes U-Mann Whitney test,
*p<0.05
**p<0.01
ns = not significant

Effects of sex, age and breed on hunting potential of pointing dogs

Table 3 shows effects of sex, age and breed on scores of the junior hunting test. Sex influenced (P<0.05) the total score as well as speed and swimming. Age group was significant (P<0.01) only in swimming. Breed was a significant factor (P<0.01) in total score and all individual categories.

Effects of sex on the junior hunting test

Effects of sex in the total score of the junior hunting tests for pointing dogs indicated that dogs outperformed bitches (P<0.05). We suppose that those differences can be attributed to the greater strength and durability of the dogs compared to bitches, as indicated by Brabletz (2015). The effects of sex was most pronounced in swimming (P<0.01) and speed (P<0.05). Those competitions that require more physical strength, which might explain better performance of the male dogs. Serpell & Hsu (2005) did not observe overall differences between sexes in training abilities, except from West highland white terriers and Dachshunds, in which dogs were more trainable than bitches. Lindberg et al. (2004) also reported higher scores in dogs than in bitches of Flat-coated retrievers, especially in the dog's reaction to the shot, reaction to the throw and cooperation.

Effects of age on the junior hunting test

Age did not have significant impact on the analysed scores of the pointing dogs (P>0.05), except from swimming. Individuals from the second age group (13-17 months of age) scored higher (P<0.01) than from the fourth age group (23-24 months of age), but the numerical difference was not too large (3.12 in group II vs. 3.07 in group IV). Lack of statistically significant influence of age on adaptive intelligence was demonstrated by Karpiński et al. (2009). It could be attributed to large ranges of the defined age groups. Lindberg et al. (2004) found more pronounced age effect on the hunting behavior of the Flat-coated retriever dogs. They found a significant impact of age on interest in searching and water retrieving as well as in searching efficiency, delivery and grip. However, no clear explanation of those effects was presented.

Table 3. The impact of the sex, breed and age on different competitions within junior hunting test of the pointing dogs.

Sex	n	Total Score	Scent	Pointing	Searching	Speed	Swimming	Obedience
Dog	875	80.12 [a]	3.05	2.86	3.32	3.38 [a]	3.21 [A]	3.72
Bitch	1233	78.49 [b]	3.04	2.77	3.27	3.30 [b]	2.99 [B]	3.73
Age group	n	Total Score	Scent	Pointing	Searching	Speed	Swimming	Obedience
1. (9-12)	220	80.25	3.11	2.89	3.35	3.40	3.02	3.73
2. (13-17)	355	79.33	3.04	2.81	3.30	3.31	3.12 [A]	3.75
3. (18-22)	244	78.36	3.01	2.78	3.25	3.31	3.09	3.68
4. (23-24)	1288	77.73	3.03	2.62	3.18	3.29	3.07 [B]	3.76
Breed	n	Total Score	Scent	Pointing	Searching	Speed	Swimming	Obedience
1. CF	58	$85.58^{5,7,11}$	$3.45^{5,7,8}$	$3.20^{5,7,11}$	3.45^{5}	3.34^{5}	$3.31^{5,7}$	$3.98^{2,5,7}$
2. GS	173	$79.00^{5,7,8,9}$	$3.00^{5,8}$	$2.68^{4,7,8,9}$	$3.36^{5,7,11}$	$3.39^{5,11}$	$3.15^{5,7,8,9}$	3.69^{1}
3. SM	80	$80.50^{5,7}$	$3.13^{5,7}$	$2.85^{5,7}$	$3.35^{5,11}$	3.33^{5}	$3.20^{5,7}$	3.72
4. P	88	$84.21^{5,7,11}$	$3.35^{5,7,11}$	$3.16^{2,5,7,11}$	$3.50^{5,7,11}$	$3.55^{5,7,11}$	$3.06^{5,7,8,9}$	3.76^{5}
5. ES	124	$64.23^{1,2,3,4,6,8,9,10,11}$	$2.40^{1,2,3,4,6,8,9,10}$	$2.17^{1,3,4,6,8,9,10}$	$2.72^{1,2,3,4,5,6,7,8,9,10}$	$2.83^{1,2,3,4,5,6,7,8,9,10}$	$2.27^{1,2,3,4,6,8,9,10,11}$	$3.41^{1,4,8,9,10,11}$
6. BS	54	$83.24^{5,7,11}$	$3.29^{5,7}$	$2.99^{5,7}$	$3.\ 56^{5,7,11}$	$3.66^{5,7,11}$	$2.98^{5,8,9}$	3.70
7. IS	348	$69.82^{1,2,3,4,6,8,9,10}$	$2.66^{1,3,4,6,8,9,10}$	$2.25^{1,2,3,4,6,8,8,10,11}$	$3.06^{2,4,5,6,8,9}$	$3.20^{4,5,6,8,9}$	$2.42^{1,2,3,4,8,9,10,11}$	$3.56^{1,8,9,10,11}$
8. GSP	464	$87.74^{2,5,7,10,11}$	$3.42^{2,5,7,11}$	$3.27^{2,5,7,11}$	$3.59^{5,7,10,11}$	$3.58^{5,7,11}$	$3.58^{2,4,5,6,7,11}$	$3.77^{5,7}$
9. GWP	160	$86.78^{2,5,7,11}$	$3.30^{5,7,11}$	$3.28^{2,5,7,11}$	$3.58^{5,7,11}$	$3.62^{5,7,11}$	$3.61^{2,4,5,6,7,11}$	$3.87^{5,7}$
10. HV	141	$82.21^{5,7,8,11}$	$3.15^{5,7}$	$3.00^{5,7,11}$	$3.26^{5,8}$	3.31^{5}	$3.40^{5,7,11}$	$3.84^{5,7}$
11. W	323	$74.09^{1,4,5,6,8,9,10}$	$2.81^{1,4,8,9}$	$2.54^{1,4,7,8,9,10}$	$3.01^{2,3,4,6,8,9}$	$3.03^{2,4,6,8,9}$	$2.93^{5,7,8,9,10}$	$3.82^{5,7}$

Effects of breed on the junior hunting test

Breed had the most significant influence on the total score as well as the scores of all competitions carried out for junior pointing dogs ($P<0.01$). The highest total score was obtained by the German shorthaired (87.74 points) and wirehaired pointer (86.78 points). These breeds are very popular working dogs in Poland due to their excellent air scent, big hunting passion and balanced character (Brabletz, 2015). On the other hand, the total performance of the English (64.23 points) and Irish setters (69.82 points) was the poorest. These breeds are characterized by elegant appearance, and in most cases they are used in Poland as companion dogs (Brabletz, 2015).

Results of the Competitions

*Scent***.** The highest results were achieved by Cesky fousek (3.45) and German shorthaired pointer (3.42), which are both characterized with excellent scent (Brabletz, 2015). Cesky fousek, known also as Bohemian wirehaired pointing griffon, is a rare, heritage breed originating from Czech Republic (Kuhn et al., 1977). During World War I it was close to extinction, but in the 1930s it was reestablished with admixture of German pointers (Kristin Mehus-Roe, 2009). English and Irish setters performed the poorest in the scent competition compared to other breeds (2.40 and 2.66, respectively). We can explain the poor performance by the fact that breeds are now used mainly as companion dogs, which could have driven the breeding more towards pleasant character rather than typical hunting abilities (Brabletz, 2015).

*Pointing***.** German shorthaired and wirehaired pointers scored high in pointing (3.27 and 3.28, respectively), which suggests their superior predispositions towards hunting. Schmutz and Schmutz (1998) obtained the same results for this competition for German shorthaired pointer and German wirehaired pointers (3.28). The North American Versatile Hunting Dog Association (NAVHDA www.navhda.org) publishes database with updated scores of the hunting tests conducted in the USA. In 2016, the breeds that produced the top scores in pointing competition were Hungarian vizsla (3.84), German shorthaired pointer (3.69) and German wirehaired pointer (3.57), while the lowest score was reached by the Weimaraner (3.07). German shorthaired pointers have been recognized as a breed since 1892, when the breed standards were written and introduced into German Kennel Club Stud Book (Vickie Lamb, 2015). German wirehaired pointer evolved from German shorthaired pointer. Nowadays, they belong to the most popular breeds of versatile hunting dogs worldwide, suitable for different type of work (i.e., hunt, point and retrieve both on land and in water). Both breeds have superior nose and speed as well as beautiful posture and social character.

*Searching***.** The highest score in the searching competition were obtained by Brittany spaniel, Pointer and German shorthaired and wirehaired pointers (3.56, 3.50, 3.59 and 3.58, respectively). The top scores were produced by the individuals able to search independently, covering a wide area and not sticking too close to the guide. Lower results of Weimaraner (3.01) could have been caused by mistake of maintaining too close contact with the handler, which is characteristic of this breed. Brenøe et al. (2002) analysed genetic parameters for hunting performance of the German shorthaired and wirehaired pointers and Brittany spaniel in Norway. Seeking width was evaluated during the test and it was based on the distance from the handler while hunting. On the scale from 0 to 6, German shorthaired pointer scored 3.24, German wirehaired pointer scored 3.33 and the Brittany spaniel – 3.26. Even though the scores reported by Brenøe et al. (2002) amounted to 66-68% of the maximum score (in our study the average score was app. 90% of the maximum), the three breeds evaluated performed on similar level, like in this study.

*Speed***.** Breeds that obtained the top results in this competition were Brittany spaniel, German shorthaired and wirehaired pointers (3.66, 3.58 and 3.62, respectively). This could have been

caused by rapid movement characteristic of these breeds. Lower performance of Weimaraner (3.03) might have been due to the slower pace and dynamics of walking attributed to their large size and moving in close contact with the handler (Brabletz, 2015). Brenøe et al. (2002) also reported similar score in speed competition for the three breeds that performed best in this study (the score of 3.90-3.95 amounted to 65-66% of the maximum score for this competition).

*Swimming***.** German shorthaired and wirehaired pointers scored the top results in swimming (3.58 and 3.61, respectively). German pointers are multi-purpose and versatile dog and the most popular breed among the gun dogs. English and Irish setters were the breeds that achieved the lowest score (2.27 and 2.42, respectively) despite being resistant to changes in the water temperature, and therefore entering the cold water should not cause them such a problem as dogs with a short coat. The differences between the Hungarian vizsla (3.40) and the Weimaraner (2.93) despite the similar body structure and coat are probably due to the fact that the Hungarian vizsla likes both terrestrial and aquatic environments (Brabletz, 2015).

*Obedience***.** Results of obedience were the highest and the most evenly distributed in this study. The reason for it is that the junior hunting tests evaluate willingness to obedience and maintaining contact with the handler rather than complete obedience, which is evaluated after the dogs undergo training (Polish Hunting Association). The working dog is the only domesticated animal that has been initially selected for behavior (Brabletz, 2015). The average result (3.72) was over 85% of the maximum number of points. Liinamo et al. (1997) found that the Finnish hound had a similarly high score (about 81% of the maximum score). In the studies of Wetten and Aasmundstan (2014) on the Norwegian breed of Elkhound grey, the animals achieved significantly lower scores (about 50% of the maximum number of points). Such results may be due to the fact that it is a primary breed and is characterized by high independence. Obedience of young dogs is influenced by many factors, including personality of the dog, socialization and relationship with the handler (Brabletz 2015).

Correlation between Competitions

Table 4 presents the Spearman's correlation coefficient between competitions in the junior hunting test of pointing dogs. A strong correlation occurred between scent and pointing (0.754), as well as between searching and speed (0.750). A strong correlation between scent and pointing is obvious and caused by the fact that when the pointing dog smells the game during scent competition, it should point at it right away. A strong correlation between searching and speed results from the pattern of movement while searching game animals. German shorthaired and wirehaired pointers move widely and quickly in the field. The Weimaraner, due to his moderate temperament, moves very dynamically and narrowly close to the handler. We also found poor or lack of correlation between obedience and other traits (i.e., speed or swimming). Even though results of obedience were very balanced between the breeds, other traits were varied as discussed earlier.

Table 4. Correlation between hunting traits evaluated during junior hunt test of the pointing dog.

Trait	Scent	Pointing	Searching	Speed	Swimming	Obedience
Scent		0.754	0.538	0.478	0.287	0.240
Pointing	0.754		0.510	0.425	0.314	0.250
Searching	0.538	0.510		0.750	0.303	0.210
Speed	0.478	0.425	0.750		0.296	0.177
Swimming	0.287	0.314	0.303	0.296		0.186
Obedience	0.240	0.250	0.210	0.177	0.186	

Conclusions

In this study we evaluated results of the junior hunting tests for pointing breeds. We found that in the category of young, untrained gun dogs, the top results were produced by the older males that belonged to German shorthaired or wirehaired pointers. It suggests that those breeds are the most suitable to perform the tasks of a working, versatile dog. The data characterize the current status of the hunting potential of different breeds of pointing dogs in Poland and can be used as a tool in further breeding and training programs.

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Abilità venatoria potenziale di cani da ferma sulla base dei test per giovani cani da caccia in Polonia

Elzbieta Bednarek, Anna Slawinska

Katedra Biotechnologii i Genetyki Zwierząt - Poland

Sintesi

I test per giovani cani da caccia valuta l'innata predisposizione venatoria dei giovani cani. Giovani cani da ferma (<2 anni di età) sono valutati in 6 competizioni: fiuto, punta, ricerca, velocità, nuoto ed obbedienza.

Lo scopo della ricerca è stato quello di analizzare l'influenza di fattori selezionati sulle performance dei giovani animali. L'analisi è stata basata sui risultati dei test su giovani cani da ferma raccolti nel periodo 2007-2015 dall'Associazione Polacca della Caccia.

Il database includeva 2107 individui appartenenti a 26 razze. L'analisi non parametrica della varianza è stata effettuata per determinare l'impatto di età, sesso e razza sulla performance del cane. La correlazione di Spearman è stata effettuata per stimare le associazioni tra i tratti. La razza ha influenzato (P <0,01) il punteggio totale e le singole categorie. I cani da ferma con le migliori prestazioni erano i pointer tedeschi a pelo corto (87,74 punti) e a pelo ruvido (86,78 punti). I risultati più scarsi sono stati raggiunti dai setter inglesi (64,23 punti) e irlandesi (69,82 punti). Il sesso ha influenzato il punteggio totale, la velocità (P <0,05) e il nuoto (P <0,01); i maschi si sono comportati meglio delle femmine. L'età non ha avuto un impatto significativo sui risultati (P> 0,05) ad eccezione del nuoto (P <0,01); i cani più anziani hanno prodotto punteggi più alti. Le categorie più correlate erano fiuto e ferma (0,754), nonché ricerca e velocità (0,750). I dati caratterizzano lo stato attuale del potenziale di caccia di diverse razze di cani da ferma in Polonia e possono essere utilizzati come strumento in ulteriori programmi di allevamento e addestramento.