

A Review of the Jindo, Korean Native Dog^a - Review -

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ABSTRACT : The Jindo is a Korean native dog, well-known for its hunting and guarding abilities. When he gives his devotion to one individual, he gives it whole-heartedly. He is not tempted easily and impetuous. The breed was not developed, but the dog retained their original qualities -loyal, alert, fearless, obedient, watchful, intelligent, energetic- to survive in the harsh environment of the Jindo island. The dog had been spread over the entire Korean peninsula from the time unknown, and the ones in the Jindo island, isolated until lately, survived and maintained their original characteristics. They are now spread over the entire Jindo County consisted of many islands, whence the breed name came. The Jindo comes in a variety of colors and color combinations, with the fawn and white colorings predominant. The dog is one of the Korean natural monuments, protected by law since early 1960s. The Jindo gained official approval by the Federation Cynologique Internationale as a hunting dog. Apart from the basic housetraining, the dog rarely gets training. Many people have attempted to preserve its pure bloodlines and original qualities. Today, there are a total of 10,356 Jindoes being raised over the entire Jindo County, and many more are kept elsewhere. A research into genetic characteristics of the Jindo is now going on, using the technique of isozyme electrophoresis. The Jindo Dog Breeding Management Center has been reinforced lately, and in addition to their routines, the Center is to work on the breeding of the Jindo. Efforts should be made in the future to produce stable, trustworthy Jindoes according to their proposed use and to modify their temperament in order to make it more widely acceptable as a pet and companion dog in the strangers home. (*Asian-Aus. J. Anim. Sci.* 2000. Vol. 13, No. 3 : 381-389)

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INTRODUCTION

The Jindo is a Korean native dog, which is a truly magnificent breed, preeminently qualified to serve proud owners in innumerable ways. Today, its primary function seems to be that of a loyal family pet, both hunting and guarding dog. The dog breed has been highly regarded for its original qualities; it is described as a loyal, devoted companion, a dog of great intelligence, and a good hunter. With its hostile disposition and aggressive characteristics, the Jindo shows a strong homecoming instinct. Because of these characteristics many people have taken a liking to the dog.

Unlike several other breeds of dogs, the Jindo was not developed. They have been just living with farmers and fishermen in the Jindo island. Since when they started living with people is anybody's conjecture. The Jindo appears to be indigenous to Korea, living in the Korean peninsula from the time unknown. To

survive in the harsh environment of the Jindo County, they had to maintain their original qualities.

Over the past thirty years, it has been one (C. G. Lee) of authors' good fortune to have opportunities to do research work on the Jindo. The present review is from literatures pertaining to the Jindo as well as from our own experiences in research on the dog.

THE ORIGIN

Tracing the early history of any dog breed is impossible (Vila et al., 1997). Thus, the precise origin of the Jindo is open to debate. From the original qualities of the Jindo, however, we are able to presume that they have been used mainly for protection and hunting since they came to Korean peninsula with the people from the north (Lee and Yoo, 1988; Ha and Kim, 1998). The dogs were spread over the entire country. We were able to see similar dogs everywhere in this country about 50 years ago. Even now we can see similar type of dogs in Cheju Island. And the Poong-san dogs from North Korea and the Jindo look alike. Like the Jindo island, Cheju and Poong-san are very secluded areas.

The Jindo County is located at the southwest end of the Korean peninsula. The County is an aggregation of islands, consisted of a total of 228 islands, of which 186 islands are not inhabited. Its main island is about 427 square kilometers, and until 1984 it was connected with mainland by ferries. The land has been

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unproductive, so that the people have lived there isolated and poverty-stricken. Like the people, the Jindo survived in the harsh environment of the County. They maintained their original qualities, especially the hunting capabilities for survival. They have been spread all over the County, even in small islands.

To survive under these conditions, they had to be energetic, watchful, alert, fearless, loyal and obedient. Old people in the Jindo island have seen and been living with those type of dogs. They still have many stories to tell about Jindo and the personalities that are legends. While the same type of dogs in mainland changed with changing life styles of people and was mixed with other breeds, the dogs in the Jindo County could retain their pure bloodlines along with their original characteristics. Due to their pure bloodlines and original qualities, especially the hunting capabilities, the dog in the Jindo County became famous in this country and whence its breed name came, as was the dogs in Poong-san, North Korea.

Park (1971) introduced assorted hypotheses concerning the origin of the Jindo, adding confusions to the native dog theory (Mori, 1940; Tagaki, 1943). He stated that it was not certain, but by words of mouth in the Jindo island the dogs could be the offspring of either the dogs of Sung dynasty in China (960-1279 A.D.) or the Mongolian dogs.

Some breeds of dogs in Japan nowadays have almost same appearances as the Jindo. Lee and Yoo (1988) reviewed the history of Japan and found that Korcan hunting dogs, together with falcons, were sent to Japan in early 5th century, which was before Sung dynasty of China. A serological and molecular biological work (Lee and Yoo, 1988) employing serum samples of both Korean and Japanese dogs indicated that Korcan dogs were sent to Japan some 1,300 to 2,500 years ago. Recent research results also indicate that Korean dogs were sent to Japan many years ago (Tanabe, 1991, 1996; Ha et al., 1998). After the historical review, Lee and Yoo (1988) concluded that the Jindo is Korean native dog, the descendants of the Stone Age dogs, as was described by the two Japanese six decades ago (Mori, 1940; Tagaki, 1943).

THE PRESERVATION OF THE JINDO

It was not until the late 1930s, when Korea was under the Japanese rule, that anyone gave any serious consideration to the Jindo. In 1938 they designated the Jindo as a natural monument (Tagaki, 1943). Mori (1940) reported the similarities between the Jindo and some Japanese dogs. After him, Tagaki (1943) closely examined the Jindo and Poong-san dogs, obviously under the necessity of getting dog pelts towards the end of World War II.

The Jindo was again designated as a natural monument No. 53 of Korea in 1962 and has been since protected by regulations. It was and still is not allowed to keep other dog breeds in the entire Jindo County. People should get permits to take the Jindo out of the island. When the first Jindo Standard was drafted in 1967, it provided only for fawn (figure 1) and white (figure 2) colorings as they were predominant (Kim, 1979).

As the dogs gained recognition, typical specimens of the breed and conform to the specifications of the official Jindo Standard were purchased and taken out by the Jindo fanciers outside the Jindo County. People who have lived in the Jindo island and owned the dogs for many years realized that the Jindo was losing its original qualities. With the changes in the life styles of people and in the rearing of the dog these days, it was inevitable for them to lose some of their characteristics and general appearances. Jindo fanciers, however, thought that the dogs were losing their pure bloodlines.

Individual breeders and local government offices in the Jindo County have been anxious since the 1960s to retain many of the original qualities and to produce old-type Jindo that helped popularize the Jindo. In 1967 the Jindo was provided for its protection and preservation in the law. And in the next year The Jindo Kae Livestock Co-operative Association of Korea was founded. Unfortunately, their attempts were not methodical. Individuals tried to breed the Jindo, which he or she thinks is typical and old-type.

In 1975 the Jindo County established The Jindo Dog Breeding Management Center. The Center conducted many activities such as judgement, registration, vaccination, worming, and culling of the Jindo. In order to produce the typical Jindo, the County office appointed some villages as Jindo Dog Breeding Village, bought male Jindo conformed to the specifications of the official Jindo Standard, and distributed them to the selected individuals in those villages free of charge. Those individuals had to pay one typical Jindo back to the Center later.

In 1996, the Jindo gained official approval by the Federation Cynologique Internationale (FCI).

- The Korea Jindo Dog FCI No. 334
- Origin: Korea
- Date of publication of the valid original standard: July 24, 1996
- Utilization: hunting dog
- FCI's classification: Group 5, Spitz and primitive types
- Section 5: Asian Spitz and related breeds
- Without working trial

By the end of 1998, it was found that there were

a total of 10,356 Jindoos being raised by 4,497 households in the entire Jindo County. Of those 6,302 are fawn dogs and 3,978 white dogs. The rest 76 are Jindoos with other colorings such as black and pepper-and-salt. The ratio of female to male dogs was 4.1 to 1, and that of fawn to white dogs 1.6 to 1. The Jindo Dog Breeding Management Center judged all Jindoos in 1998 and found that 2,087 dogs (20.2%) conformed to the official Jindo Standard. Of those 1,985 (1,769 females and 216 males) were placed a microchip in the region of withers subcutaneously.

Apart from the Jindoos present in the Jindo County, a large number of Jindoos are being kept outside the County. Yoon (1997) estimated that the number of those Jindoos could be in the neighborhood of 160,000.

The future for the Jindo looks bright. The magistrate of the Jindo County, Mr. S. M. Park has got money somehow in 1996 and reinforced The Jindo Dog Breeding Management Center in 1998. The Center is now equipped with research personnel and facilities so that research work can be done at the Center. With the ongoing research described later, efforts will be made at the Center to produce old-type Jindoos, which have the original qualities, according to their proposed use. Attention should also be given to modify Jindo's temperament in order to make it more widely acceptable as a pet and companion dog in the stranger's home.

BREEDING

A survey was conducted in the Jindo County (Kim et al., 1986). On the purpose of keeping the Jindo, the majority (61.7%) of Jindo owners answered that they keep the dog for farmhouse income. Thirty-three percent of them keep the Jindo for watchdog, and only 4% for hunting and 1.3% as a pet. The results indicated that the Jindo is one of the sources of household income in the Jindo County.

As they are small holders, most of them (80.3%) feed the Jindo scrap food. Eighteen percent of them feed the dog a mixture of commercial feed stuffs and scrap food. The rest are intensive breeders and give the dog only commercial feed stuffs.

In the old days almost all of the Jindoos were reared unleashed in the farmhouse as part of the family. Nowadays, more than half (51.3%) are reared in such a fashion (Kim et al., 1986). They go to the field with their masters or stay home watching the house while masters are away. Forty-six percent of Jindoos are reared leashed, and the rest 2.7% are kept in the kennel.

Bitches first come into heat at about nine months of age, but the age may vary anywhere from seven to fifteen months, even among littermates. A normal heat

lasts anywhere between 6 and 14 days.

After the initial heat, which may vary both in length and intensity depending on age, a bitch usually comes into heat again approximately every six months. They are seasonal breeders, coming into heat in the spring and fall season. Only 22.2% of bitch owners choose the available stud dogs to breed their bitches. The rest leave their bitches to be bred by any male Jindo.

The litter size is three to six puppies (on average 5.2). The puppies are weaned 40 to 50 days after they are born. Apart from the basic housetraining, puppies rarely get training. Only 2.6% of Jindo owners answered that their dogs get special training for hunting or guarding. Thirteen percent of them get the basic housetraining only, and the rest do not get training whatsoever.

The major problems in raising the Jindo are diseases such as leptospirosis, canine distemper, infectious canine hepatitis and parvovirus infection. Although the infection rate is low, it is considered that canine heartworm infection (Lee, 1971; Kim et al., 1985; Lee, 1996; Kwon, 1999) and other parasitisms (Cho et al., 1981) cause the death of the Jindo. Another cause of the death is poisoning during the harvest season when farmers use rodenticides in the field.

THE COAT COLOR

It has been known that the Jindo comes in a variety of colors and color combinations; fawn, white, black, black and tan, red, brindled, so on (Mori, 1940; Tagaki, 1943). The coat color of the Jindo was determined (Kim et al., 1986) and later reviewed (Lee and Kim, 1993), and seven different coat colors with typical color combinations were found to be present.

Fawn

The most prevalent coat color in the Jindo (figure 1). Some have light yellowish-brown coat and others dark yellowish-brown coat. They often have a sprinkle of black hairs on the back. Some of fawn Jindoos have white speckles above two eyes, on both cheeks, under the chin, on the chest, and on the belly. These dogs are called Yibaik, literally meaning hidden white (figure 3).

White

The prevalent coat color next to the fawn (figure 2). They have a sprinkle of fawn hairs inside of the ears, on the back, the crook of the knee and elbow, and tail.

Red

The glossy red coat color. They were classified as



Figure 1. Fawn Jindo, male



Figure 2. White Jindo, male



Figure 3. Fawn Jindo (Yibaik), male

fawns previously, but are distinct from fawns (figure 4). As with the fawns, they often have a sprinkle of black hairs on the back and some have Yibaik colorings.



Figure 4. Red Jindo, male

Black

Black Jindoos are regarded as having good qualities. They have a variety of color combinations; complete black (figure 5), ones with white dots on the chest and feet, and four-eyed. The four-eyed Jindoos are same as Yibaik, only with different color combinations, in which either white (figure 6) or light yellowish (figure 7) hairs are present on the black ground. When the hair-coats of black Jindoos are reflected by sunlight, the hairs often look red.

Tiger stripe

Also called brindled, they have black stripes on the yellowish-brown ground (figure 8). As they have good personalities, the Jindo people fancy them. In the Japanese history it is described that the tiger stripes, together with falcons, were sent from Korea to Japan (Lee and Yoo, 1988).



Figure 5. Black Jindo, male



Figure 6. Black Jindo (white four-eyed), male

Pepper-and-salt

A kind of cryptic color. Having the interspersed black, white and fawn hairs, they look gray, as seen in Standard and Miniature Schnauzers. Thus, people call them gray dogs. They are rare, but often retain original qualities (figure 9).



Figure 7. Black Jindo (yellow four eyed), male

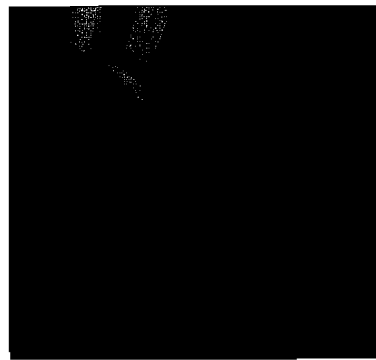


Figure 10. Spotted Jindo, female



Figure 8. Tiger striped Jindo, male



Figure 9. Jindo, pepper-and-salt, female

Spotted

The rarest color combinations among the Jindo. They have large black or fawn speckles on the white ground (figure 10).

A DESCRIPTION OF THE JINDO

The Jindo is a well-proportioned dog used for hunting and guarding. When he gives his devotion to one individual, he gives it whole-heartedly. He is not tempted easily and impetuous. He accepts a new master, but never forgets his attachment towards the former master who raised him from puppy-hood. The Jindo, as a rule, is not friendly with strangers and seems to resent being touched by those he does not know.

The official Standard for the adult Jindo was compiled by a panel of experts in the Jindo County in 1967 and was revised in 1998. Nowadays, one finds a significant variation in both type and substance. However, the breed Standard alone defines the guidelines by which Jindo are to be judged, and then registered in the Jindo County and at various shows.

General conformation and appearance - The appearance is that of a dog of medium size, with a perfect balance and good muscular development. The Jindo should be smart in appearance.

Height - at the withers - **Dogs**, 48~53 cm; **Bitches**, 45~50 cm. The ratio of body height to length should be 100:110.

Head and face - When seen from the front, the face should be roughly inverted triangle, with friendly expressions and alertness. Forehead is broad, and the line from the forehead to the muzzle is unbroken. The width between the ears is moderate to the size of the head. The line from the skullcap to the point between two eyes is longer than the line from the point between two eyes to the end of the nose.

Ears - Should be small and erect and triangular in shape. They must tilt slightly forward, with a vigorous movement.

Eyes - Should be dark brown in color and roughly elliptical, with the slightly upward outer canthi. Iris is varying in color depending on the coat color.

- Nose** - Should be black.
- Back** - Must be firm, of sufficient width and extended in a straight line from withers to the croup, with slightly higher front.
- Chest** - Should be broad with fore-chest well defined.
- Belly** - Should be well tucked up, extending in a curved line from the brisket.
- Legs** - Forelegs should be strong, straight and appropriately spaced. Hind-legs should be appropriately spaced and trampled.
- Tail** - Must be rolled up or sickle-shaped. When let down, the tip of the tail should reach the hock.
- Gait** - Should be free, balanced and vigorous. Each hind-leg moves in line with the foreleg on the same side. Back remains straight and firm.
- Character** - Should be loyal, fearless, alert, obedient, watchful and energetic. The Jindo must have a clean habit and show the hunting and homecoming instinct, and should not be easily tempted.
- Coat and color** - A double coat in general and smooth-haired and shiny. Outer coat is stiff and stands out. Compared to the hairs of the body, the hairs on the face are shorter and close lying, and those on the tail longer. As was described, the Jindo comes in seven different coat colors, with some color combinations. Only fawn and white are allowed by the official Standard. Many Jindo owners strongly hope that other coat colors are also allowed by the official Standard.
- Skin** - Should be red brown and tight.
- Whiskers** - Should be symmetrical on both cheeks and straight.
- Teeth** - Should be well developed, solid and strong, with a scissors bite. The teeth should be well arranged and not missing.

RESEARCH

Research work on the Jindo first started in the late 1960s. The dogs were examined for their general appearances (Park, 1971) and blood pictures (Park, 1972) towards the end of 1960s. Along with Park's work, some of the blood samples were parasitically examined and found to be infested with canine heartworms (Lee, 1971). Kim (1974) classified the phenotypes of hemoglobin, albumin and transferrin in the Jindo by starch gel electrophoresis and reported their frequencies. In 1979, the first book on the Jindo was written by Kim.

In the 1980s, more work has been done on the Jindo than during the previous decade: hematology and biochemistry (Park, 1980; Park et al., 1980; Rim et al., 1980; Kim et al., 1988a, b), reproduction (Kang et al., 1988), and parasitism (Cho et al., 1981; Kim et al., 1985). An extensive work on the Jindo has been conducted in 1986-87, supported by a grant from

Jindo County. Kim et al. (1986) performed a baseline work on the Jindo concerning the literature review, body type and general appearances (measurements), rearing conditions, and diseases. Immediately after it another work was performed on the origin, blood picture, biochemistry, and blood types of the Jindo (Lee et al., 1987). The results of those two projects were published on the blood groups (Han et al., 1988), the origin (Lee and Yoo, 1988), and hematologic values (Lee et al., 1989).

The research work on the Jindo has been continued with much more work done in the 1990s. Cells involved in spermatogenesis were examined (Park and Lee, 1992a, b; Kim and Park, 1993; Park et al., 1993). Serum proteins of the Jindo were compared with those of other dog breed, Sapsaree (Ok et al., 1990; Kim et al., 1992a, b) and their mitochondrial DNA with that of Japanese mongrels (Han et al., 1993). Serum chemistry values (Lee et al., 1992) and the coat color of the Jindo (Lee and Kim, 1993) were reported. In a study by Moon et al. in 1994, 50 Jindoes were tested serologically for *Brucella canis*, and only one of those was found to be seropositive.

In order to determine the estrous cycle, ovulation and optimal breeding times, the vaginal cytology was examined in 13 Jindoes and their plasma estradiol-17B and progesterone levels were assayed during the estrous cycle (Son et al., 1996a). The same research team examined the ultrasonographic appearance of gestational structures throughout the whole pregnancy in the Jindo. They determined the time when the fetal and extra-fetal structures could first be detected by ultrasonography (Kang et al., 1996) and then estimated the gestational age by measuring the fetal and extra-fetal structures with the technique (Son et al., 1996b). They estimated the time of ovulation and mating in the Jindo based on plasma progesterone concentrations (Son et al., 1997). By using the ultrasonography, Kim (1999) examined the postpartum uterine involution in the Jindo.

The Jindo was included in a survey on the infection rate of canine heartworm, using modified Knott's test and antigen test by Lee in 1996. Echocardiography of twelve Jindoes naturally infected with heartworm was analyzed along with vital signs, microfilaremia, and blood chemistry (Kwon, 1999). Jindoes were experimentally administered per os with ivermectin, and their clinical and hematological changes (Lee et al., 1997) and histopathological changes (Oh et al., 1998) were examined, together with the determination of ivermectin residues in their tissues (Lee et al., 1998b).

Ha and Kim (1998) reviewed the origin of Korean native dogs, including the Jindo, by the results of investigations of phylogenetic relationships among Asian dog breeds and concluded that Korean native dogs

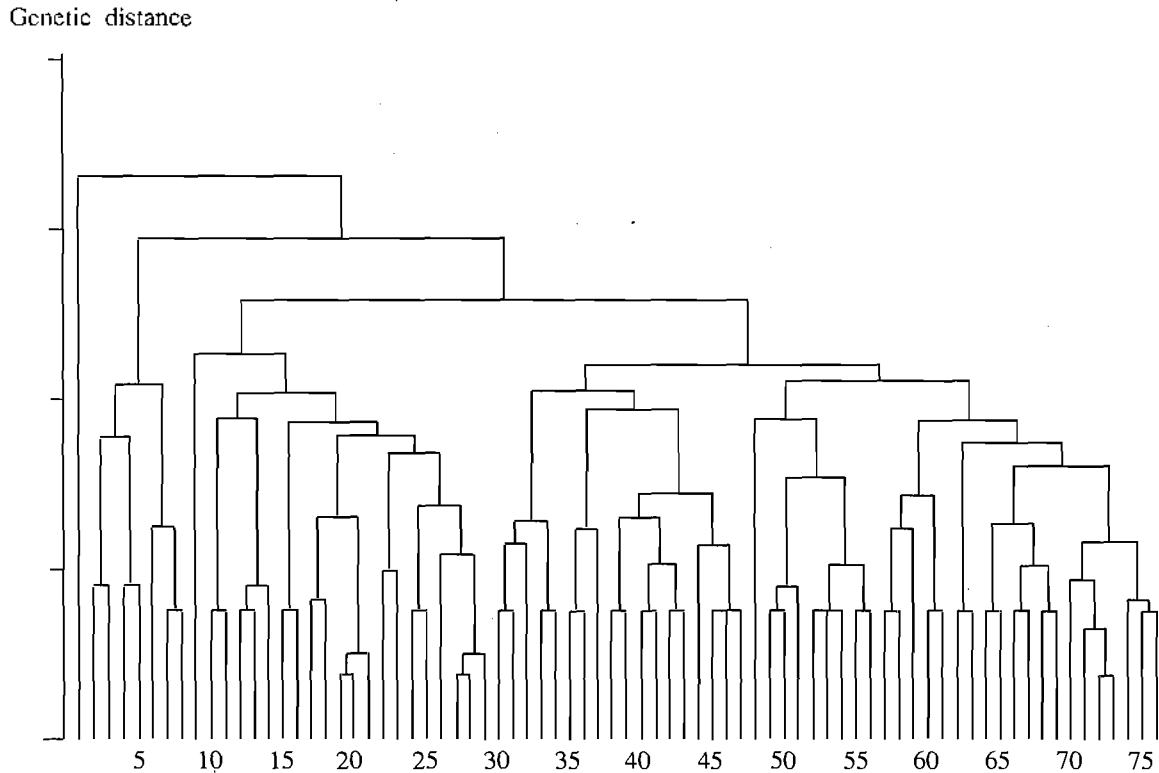


Figure 11. Phenogram of the genetic distances among electrophoretic types of the Jindo dogs, clustered by the UPGMA (unweighted pair group method using arithmetic averages) strategy

originated from the dogs of northern part of Far East Asia. Ha et al. (1998) reviewed the prototypes of physical characteristics and blood proteins of Korean native dogs, including the Jindo, Cheju dog and Sapsaree and found that they have a close relationship among them.

One of the authors of the present review was invited to the 4th annual meeting of Korean Federation of the Societies in Animal Sciences to present a paper on "Preservation and rearing of Korean Jindo dogs" (Lee, 1994). Later, he presented a paper on "The characteristics and preservation of the Jindo" at one seminar (Lee, 1997).

Our ongoing research into genetic characteristics of the Jindo was supported by a grant from Jindo County (Lee et al., 1998a). The technique of isozyme electrophoresis was developed and used to assess genetic relationships amongst Jindo dogs. Genetic variants of nine blood enzyme loci controlling the structure of adenosine deaminase, adenylate kinase, esterase, glucose-6-phosphate dehydrogenase, L-lactate dehydrogenase, malate dehydrogenase, mannose-6-phosphate isomerase, phosphoglucomutase, and phosphogluconate dehydrogenase were analyzed using starch gel electrophoresis. Samples of blood were taken from other breeds of dogs, 41 German Shepherds, 7 Japanese dogs and 6 Poong-san dogs and compared

with 661 Jindo dogs. Genetic distances were calculated from the gene frequencies of polymorphic loci. They were separated into four distinctive groups, the Jindo, the Poong-san, the Japanese dogs and German Shepherds and divided into 93 electrophoretic types (ET). The results clearly showed that the Jindo was more closely related to the Poong-san than to the three breeds of Japanese dogs (Akita, Kishu and Shiba) and German Shepherds. Jindo dogs were distributed into 72 ETs (figure 11). Many of them were found in the same ETs, thus indicating that they are closely related. ETs 50 and 35 were found to have 204 (31.5%) and 65 (9.85%) Jindo dogs, respectively. Of the 72 ETs, 47 had single dog each. Most of the Jindo dogs located at ETs 50 and 35 conformed to the specifications of the official Jindo Standard.

Attempts have also been made to find genetic markers for the Jindo using random amplified polymorphic DNA and microsatellite marker. Genomic DNA from Jindo dogs, Japanese dogs and German shepherds were amplified by polymerase chain reaction with random primers and dinucleotide repeat microsatellite loci, and their polymorphism were analyzed. We found that some polymorphism could be used as genetic markers for routine parentage testing and pedigree analysis in Jindo dogs.

CONCLUSIONS

As was mentioned previously, the Jindo is one of the sources of household income for the farmers in the Jindo County. Typical specimens of the Jindo have always been priceless. Even if the dog is protected by the law, typical specimens of the breed and conform to the specifications of the official Standard are purchased and taken out by the Jindo fanciers outside the Jindo County. This is one of the reasons why the Jindo in the Jindo County have not been maintained properly.

It is hoped that everyone who considers him or herself a serious Jindo fancier will try to effect some improvement in each ensuing generation. Based on this premise, one should choose the best available male Jindo that one can comfortably afford. However, the attempts made by Jindo breeders and fanciers, both in the Jindo County and elsewhere, were not methodical in producing the stable and reliable Jindo. In this regard, virtually no research work has been done so far on the Jindo, which are kept outside of the Jindo County.

Another reason why the Jindo loses its original qualities is the changing life style of human beings. People do not have time to care their pets as previously. In addition to this, the Jindo is raised intensively nowadays. Environmental influences play a most significant role in the dog's personality. Indeed, even for typical puppies, the daily environment is critical, especially with regard to socialization, training, and general management.

It is fortunate for Jindo that The Jindo Dog Breeding Management Center has been reinforced last year. In addition to the routines, the Center is going to work on the breeding of the Jindo from now on. The personnel at the Center will have to recognize the fact that they have a responsibility to produce stable, trustworthy dogs of which we all can be proud. We can say that this is the first significant step in the development of the modern Jindo. Correct rearing and handling, coupled with favorable environmental factors, play important parts in the satisfactory development of any dog breed.

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