



**Fédération
Cynologique
Internationale**

For Dogs Worldwide

PROPOSAL

NEW MEASUREMENT METHOD TO DETERMINE JUMPING HEIGHT IN FLYBALL DOGS

Belgium, June 2014

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Introduction

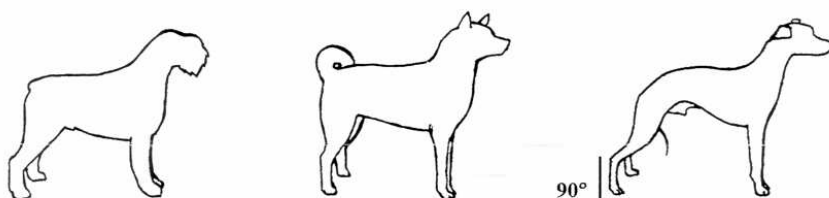
In the sport of flyball it is a general rule since decades to determine the jump height of a dog, according to the height at the withers. This rule was copied from the rules for flyball from North American Flyball Association (NAFA[®]) and has been a hot issue in flyball and other dog sports ever since. One assume that the height of shoulders has nothing to do with jumping capability of a dog, where others complain mainly that the precise height of withers is very difficult to determine and can easily be manipulated. Since a difference of 1 or 2 inches in jump height makes a huge difference in running speed, this issue has caused for lots of discussions.

Therefore we propose to change the way of measuring and to set jump height according to the length of the leg bones. This document has been issued in order to support this proposal. This file has been issued originally by the Belgian flyball section of KKUSH in Dutch language in 2009 and translated into English and modified for the FCI-flyball-commission in 2014.

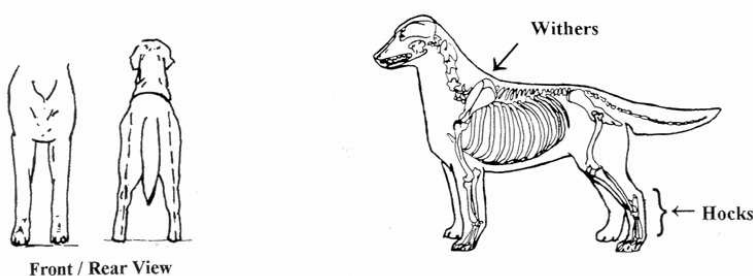
History

Until 1984 the jump height for all dogs of the team at flyball was set by the height at the withers of the smallest dog, without any deduction. Minimum jump height was 10" and the maximum 18". In November 1984 NAFA[®] was founded and the rules were adjusted. From the height at the withers 4" were now deducted, and before the jump height of a dog was final, it needed three measurements from three different judges. When flyball was introduced into Europe, this rule was generally adopted, were 10cm was deducted from the withers. The fact that from the beginning three matching measurements from different judges were required, tells already that even NAFA[®] knew that this method of measuring was not always accurate nor objective. As you can see from the illustration from NAFA[®]-rulebook describes the proper stance for measuring. This remains the most subjective part of the whole measuring method.

NAFA Flyball Measuring Stance

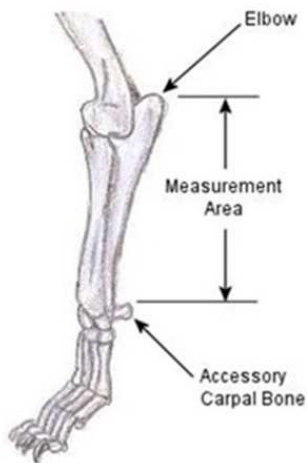


Dogs standing properly to be measured. Hocks are perpendicular to ground regardless of length of stifle.



Front / Rear View

In 2004 in Las Vegas USA a new flyball federation was founded, United Flyball League International (U-Fli), and they introduced a new way of measuring. Here the bone structure of the dog is used, and the judge measures the distance between the dogs elbow and the pisiform bone of the dog's front leg (ulna-bone). Since this is a quite accurate and objective method of measuring, the dog only needs to be measured once. Also dogs with larger chests or shorter legs (achondroplastic dwarfdogs) are less penalized in this new measuring method.



However, U-Fli came with a conversion table, that resulted in much lower jump heights for all dogs. All dogs dropped at U-Fli several inches. Mainly due to that fact, Europe reacted negatively on this new measuring, and this was

not adopted at all and the baby has been thrown out with the bathwater.

In the meantime, in 2008 NAFA[®] reacted with lowering their jump heights with 5" instead of 4", which was immediately followed and taken over by most national bodies governing flyball in Europe and the rest of the world.

Since every country is actually still following their own rulebooks, Federation Cynologique Internationale (FCI) formed in 2013 a flyball commission with first objective to issue an international rulebook. This commission started with a new rulebook from scratch, trying to implement their experiences. Here the discussion of measuring method surfaced again.

Problems withers measuring

Jump heights go hand in hand with measuring dogs. Some way or another, a certain value or values need to be converted into a jump height. In the early days the agility measuring method using a wicket to determine the height at the withers was adapted to flyball. However, this method showed severe shortcomings.

accuracy

Although it is not impossible to measure an accurate shoulder height, it remains very difficult, especially for not properly educated humans. Dogs don't tend to stand very still and lots of factors influence this height. The stance of the head and the position of the legs or feet can make a lot of difference. More over, handlers tend to teach their dogs some kind of a 'measuring posture' in order to have the lowest height possible. Measurements usually take place before a competition and are for dogs pretty stressful, causing forced postures. Judges need to be taught what to look for but one judge can still get a totally different measurement than another judge with the same training. In Europe we also see big differences in the way of measuring, depending on the country. As a result of the above, this measuring method is also subjective and could be influenced by judges.

correlation with jumping capability

For determining the jump height of a dog, you should try to figure out the real ability of the dog for jumping. But, as a matter of fact, the height at the withers has nothing to do with the real jumping ability of a dog. Of course there is not one value that can reflect everything. In order to determine the real jumping capability, you should consider several factors, like weight, muscle size, angulations, length of legs, depth of chest, etc

There is not one good reason why the height at the withers would be a good determinant factor to determine any kind of jumping ability.

depth of chest

Since the height at the withers includes the full height of the dog's body, mainly dogs with deeper chest are heavily penalized and receive disproportional jump heights. This has definitely a big impact on the health of the dogs and on motivation of handlers.

stressful and time consuming

As a result of the above reasons it is necessary to make several measurements before the dog can have its final jump height. It is not unusual that certain dogs need to be measured five times or more before they have three matching values. This means that this method is also stressful for dogs and handlers, and it is very time consuming in the organisation of tournaments.

Alternatives

Considering the above, we can conclude that the withers are not an ideal method to determine jump height. If we want to find another, better way of measuring, we need to evaluate the options.

converting bone length into withers height

Certain scientific lecture exists about the estimation of shoulder height from long bone measurements.

Harcourt¹ has collected data on dog measurements and, making use of long bone measurements, he developed a method whereby shoulder height of dogs could be estimated. This methodology is an extinction of Koudelka's² work and is known as the Harcourt Factors. These factors come from archaeology and are using the length and diameter of skeleton bones to determine shoulder height.

Without any doubt, it should be possible to determine shoulder height according to the length of certain bones, however this does not help us out a lot in this discussion. Measuring several bones remains time consuming and the result is still the height at the withers, a height that is not a good value to determine jumping ability.

Although there are no known scientific reports proving the relation between bone length and body height with canines, there is one Chinese humane study³ that made a statistical analysis that showed a very high linear correlation of height with arm span, foot length, and segmental bone lengths. The measurements included standing height, weight, arm span, foot length, and segmental bone length of the humerus, radius, ulna, and tibia.

Weight:height ratio

It's common knowledge that the weight:height ratio is an important factor in determining jumping ability. The heavier a dog is in relation to his height, the more effort will be required during jumping and the more stress will be on the entire system. It is readily apparent that the lower the weight:height ratio, the easier it is for a dog to jump. This factor might be used while determining jumping ability. However, using the weight of a dog, might influence handlers to increase the body weight before measurement, and decreasing the weight afterwards. Practically it will not be possible to remeasure the weight of the dog regularly. A ratio that can be influenced during the life span of a dog can never be used as an objective factor.

¹ Harcourt R.A. : The dog in Prehistorie and early history 1974

² Koudelka F. : Die Tierknochenfunde aus den spätrömischen Siedlungsschichten von Lauriacum

³ Cheng, J : Can We Predict Body Height from Segmental Bone Length Measurements? 1998

hindleg

Without any doubt, the most determining factor to be found is the hind leg of the dog. The hind leg muscles and their angulations are definitely very important values in order to determine jumping ability. However, the strength or size of muscles are impossible to use as values, while those are strongly influenced by training and are also not stable for the dog's life. On the other hand, angulations and related lengths of the different bones remain unchanged, and will affect the jumping ability of a dog. It is commonly known that the shorter the bones are, the steeper are the angulations of the limb, resulting in poorer jumping ability. Therefore, it seems accurate to claim that longer bones in the hind leg will have a positive effect on the jumping ability of dogs. Problem remains, that the length of both femur and tibia are difficult to measure without specialized equipment, mainly due to muscularity.

frontleg

In her famous book Dr. Chris Zink writes about the dog's front assembly that "the length of a dog's legs is another factor in jumping. The greater the length of leg from the ground to the elbow as a percentage of the dog's height at the withers, the greater the advantage to the dog in jumping. The simple reason is that a dog that is longer from the ground to the elbow has a higher centre of gravity in relation to its jump height. In addition, during jumping, the majority of the lengthening of the leg takes place above the elbows. Thus, the elbows act as a fulcrum from which the leg extends. It is an advantage in jumping to have that point as high as possible in relation to the height of the jump. This is like watching two pole vaulters approaching an 18' jump. One has a 14' pole and the other has a 19' pole. Which is more likely to clear the jump?"⁴

Additionally to the above, there is proof about the correlation of the length of different bones between hind and front leg. Von den Driesch⁵ showed that there is a strong correlation between the length of femur / humerus and between tibia / ulna.

Therefore, we believe that there is sufficient scientific proof to assume that length of the ulna bone has a correlation with jumping ability.

⁴ M. Zink D.V.M., Ph.D. : Jumping from A to Z 1995

⁵ A. Von den Driesch : A Guide to the Measurement of Animal Bones from Archaeological Sites 1976

Statistics

Several years ago, when above explained theory, first started to appear in Europe, the Belgian flyball section started with a first statistic, comparing both withers and ulna-length with the speed and jumping capability of dogs. Fifty dogs were measured in 2009, comparing actual withers and ulna lengths (annex 1). The correlation of the old jump height compared with the personal best time (0.70526) was exactly the same as the correlation of the ulna-length with this personal best time (0.70819). However, after filtering out only the 38 border collies, the correlation became much less significant but with a much higher advantage for the ulna bone (0.036 vs 0.099). This did not prove a lot of course, except that statistically there was certainly no disadvantage for the ulna-measuring, compared to the withers method.

Still, even in the first tests, several measurements stood out in both directions. Some dogs with strong physical resemblance, but where one dog was significantly faster than the other one, showed a longer ulna for the faster dog. For instance, D1 and D2 two border collie sisters from the same litter. D1 never succeeded in running faster than 5.25 on a flyball course, where D2 easily ran 4.75, nevertheless both dogs were similarly trained and had practically the same height at the withers. With the ulna bone measurements, D1 scored 14.75 where D2 had 16.25. Both dogs had almost the same height at the withers of 45 and 46cm.

We had a similar example with C1, a very fast height dog, with only 40cm at the withers. Compared to other dogs of the same height, she was very fast (4.08 pb), and this showed also in a relatively long ulna bone (15.35).

Also in other dogs, we found that smaller dogs, jumping easily very high had relatively longer bones, compared to dogs that had more difficulty in jumping high. Obviously, we also found dogs where this was not so obvious, but we did not find any significant examples the other way around.

In the first measurements, we found an average factor of 2.89, ulna vs withers, with a minimum of 2.49 and a maximum of 3.54. Generally, dogs with a lower factor were slower dogs, and vice versa.

After this data, the Belgian flyball section decided to implement this new method of measuring and made a conversion table, aiming to keep in the best possible way the same jump height for all dogs.

In the meantime, over 200 dogs were already officially measured and converted to the new Belgian jump heights (annex 2 – full details can be requested at the Belgian flyball section).

After the first meeting of the FCI-flyball-commission in 2014 the Czech Flyballclub started a national survey via their website to make similar measurements. Data of almost 100 dogs were collected (annex 3).

In the Czech measurement the average conversion factor was 2.99 with a minimum of 2.27 and a maximum of 3.43.

Conclusion on measuring method

If we consider all of the above, we believe that it is fair to point that the measurement of the ulna bone is a better alternative to determine the jump height, compared to the height at the withers.

Still, there is need of a fair conversion of the ulna length towards a jump height. It is clear that both values are not always linear, so this would mean that dogs would shift in jump heights.

It would also be fair to consider that no handlers or governing flyball bodies will find it fair to increase lots of jump heights for existing licences. It would be impossible to force higher jump heights as before to dogs that are already competing.

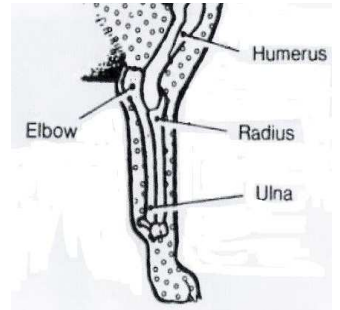
Therefore we see two possible alternatives:

- either the conversion table should aim towards a slightly lower jump height for the dogs, in order to avoid in a maximum way that dogs would increase in jump height.
- or all dogs that have already a registered jump height, can keep the height, also after implementation of a new method.

(or a combination of the two above)

Method of ulna measuring

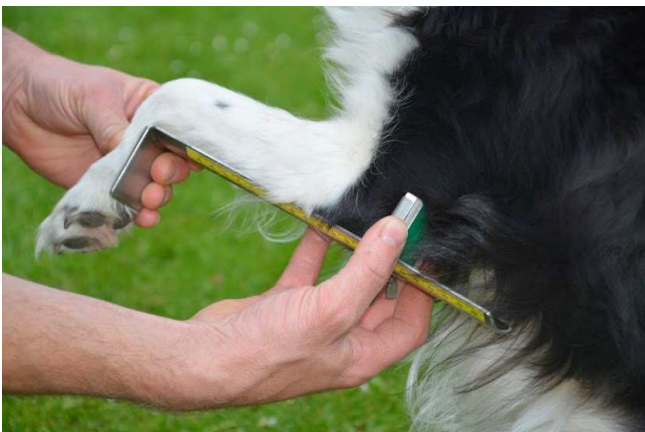
In order to understand clearly the way of measuring, we include some pictures. One might measure with a regular measuring rod, as long as the paw is held in the right position. However, we advise to use a designed measuring device, with a right angle at one side, a curved measuring surface and a sliding mechanism. Ideally you can read the length while the device is held in position around the forearm. If not, you should be able to fix the measuring tag, so that it cannot move after the paw was removed.



For measuring correctly, the three bones of the front paw should be held in two angles of 90° . Especially the stand of the forefoot of the dog is important, which should be correctly at right angles.

The distance to be measured is from the wrist to the point of the elbow. The upper arm and the forearm should also be kept at 90° . The judge will support the forearm (ulna) to the curved surface of the device and slide the mechanism towards the elbow point.

Eventually, it might also be noted that the real length of the ulna-bone might be determined by radiography. Of course, this would cause higher expenses, and would require a modified conversion.



Converting ulna towards jump height

The most difficult part of the discussion remains, how to convert the length of the ulna bone into the appropriate jump height. Actually there are several possible proposals.

Via withers

Theoretically, one might convert the ulna bone to the withers, and deduct the usual 12.5cm (5") of this value. A possible factor, according to the different measurements might be 2.90.

If we would take for instance a dog with ulna bone 15cm, this would result in a theoretical withers height of 43.5cm = jump height according to actual NAFA[®]-rulebook 30cm.

Advantage: This would make it easy to convince different sides, because the change seems smaller. It could be a compromise because the method of measuring would change, but the calculation method could remain similar to NAFA[®]. There would also be possibility to take another factor, aiming at a slightly lower jump height (eg 2.75).

Disadvantage: Converting to withers is not logical, if we want to avoid this value, because it was clear that the height at the withers is not a good value. Why looking for a compromise if there are better (and easier) alternatives.

U-Fli

The first organization that implemented the ulna-measuring was U-Fli. With their conversion table they aimed at clearly lower jump heights, practically making the use of height dogs obsolete. For information we give the conversion table used by U-Fli :

Up to 4.5"	6"
Over 4.5" up to 5"	7"
Over 5" up to 5.5"	8"
Over 5.5" up to 6"	9"
Over 6" up to 6.5"	10"
Over 6.5" up to 7"	11"
Over 7"	12"

Above dog with an ulna bone of 15cm (5.9") would jump 9" (22.5cm).

Belgian KKUSH

In the Belgian FCI-competition, this method of measuring was implemented in 2010 to everyone's satisfaction. The conversion table that was used is as follows:

ULNA		JUMP
0	8,99 cm	17,5
9	10,49 cm	20
10,5	11,99 cm	22,5
12	13,49 cm	25
13,5	14,99 cm	27,5
15	16,49 cm	30
16,5	17,99 cm	32,5
18	+	35

Over 200 dogs were measured in the meantime, and generally all dogs remained at the same height, or dropped 2.5cm. Some exceptions increased or dropped with 5cm.

Disadvantage: This was true, except for some smaller dogs. Several small dogs increased in the jump height. However, Belgian point of view in this situation was that all of the small dogs that increased with 2.5cm, all were dogs that had good jumping ability. It is a well known fact and clearly described in literature that smaller dogs have relatively much better jumping capability than larger dogs mainly due to a good weight:height ratio. Small dogs like Jack Russel Terriers easily jump two or three times their own height, which cannot be told about larger dogs.

Czech proposal

After the survey in Czech Republic, Czech flyball club gave a new proposal for a conversion table, based on the collected data.

0 – 10 cm = 17,5 cm

10,1 – 11 cm = 20 cm

11,1 – 12 cm = 22,5 cm

12,1 – 13 cm = 25 cm

13,1 – 14 cm = 27,5 cm

14,1 – 15 cm = 30 cm

15,1 – 16 cm = 32,5 cm

16,1 and more = 35 cm

Disadvantage: Dogs with ulna above 16cm would all fall back to a maximum jump height of 35cm. Lots of dogs with actual heights of 32.5 and even some of 30cm have ulna-bones larger than 16cm.

Above dog with the ulna of 15cm would jump according to this proposal 32.5cm.

FCI proposal

The actual proposal of this file, is the following table, which holds the middle between all three possibilities above.

The table works with increments of 1.25cm, which equals ½ inch. This implies that the table can be used both in inches as in the metric system.

0 – 10 cm	= 17,5 cm	0 – 4"	= 7"
10,1 – 11.25 cm	= 20 cm	4.1 – 4.5"	= 8"
11.3 – 12.5 cm	= 22,5 cm	4.6 – 5"	= 9"
12,5 – 13.75 cm	= 25 cm	5.1 – 5.5"	= 10"
13,75 – 15.00 cm	= 27,5 cm	5.6 – 6.0"	= 11"
15,1 – 16.25 cm	= 30 cm	6.1 – 6.5"	= 12"
16.3 – 17.5 cm	= 32,5 cm	6.6 – 7.0"	= 13"
17.6 and more	= 35 cm	7.1 and more	= 14"

We strongly believe that above explained measuring method and this conversion table would mean a better way of determining jump height in international flyball. Therefore we ask all concerned countries to evaluate the above, and give us remarks on the proposition. At the latest upon the next meeting of FCI-flyball-commission, the final way of measuring should be decided.

ANNEX 1**First Belgian Measurements oct 2009**

Naam	RasNaam	schoft	NAFA®	ulna	pb
Cobber	Border collie	43	30	16,1	4,18
Deejay	Border collie	53	35	16,85	4,1
Twister	Border collie	54	35	18,35	4
Caithlyn	Border collie	51	35	17	4,36
Dizzy	Border collie	45	32,5	14,75	5,25
Bob	Jack Russell Terriër	29	17,5	9,7	5,9
Ego	Border collie	52	35	18,2	4,18
Enya	Border collie	45	32,5	15,9	4,32
Asterix	Border collie	50,5	35	15,65	4,31
Pruts	Jack Russell Terriër	27	17,5	8,5	6,2
Donder	Border collie	50	35	17,15	4,19
Yeno	Border collie	49	35	18,2	4,89
Sisse	Border collie	40	27,5	13,9	4,33
Baika	Border collie	47	32,5	16,25	4,88
Luna	Border collie	45	32,5	15,15	4,89
Dizzy	Border collie	45	32,5	16,05	4,88
Dobey	Border collie	53	35	19,1	4,78
Enya	Border collie	49	35	16	4,9
Falco	Border collie	48	35	17,8	4,38
Dinky	Border collie	46	32,5	16,25	4,74
Nike	Onbekend / kruising	36	22,5	12,5	4,49
Dino	Border collie	53	35	18,5	4,38
Elli	Border collie	46	32,5	16,35	4,61
Enzo	Border collie	50	35	18,25	4,28
Beau	Border collie	42,5	30	15,6	4,29
Enja	Nova Scotia Duck Tolling Retriever	42,5	30	16,35	5,6
Ozzy	Australian Shepherd	51	35	18,85	4,28
Spike	Border collie	53	35	18,3	5,1
Tommy	Border collie	53	35	18,8	4,16
Yaro	Border collie	99	35	18	4,6
Aïscha	Border collie	42,5	30	17,05	4,42
Zeus	Border collie	99	35	18,3	4,84
Darwin	Nova Scotia Duck Tolling Retriever	50	35	18	4,89
Flay	Border collie	46,5	32,5	16,35	4,33
Caitje	Border collie	40	27,5	15,35	4,08
Nick	Jack Russell Terriër	30	17,5	9	6,15
Ramses	Jack Russell Terriër	29	17,5	8,2	6,25
Ceppe	Jack Russell Terriër	33	20	10,5	5,75
Finny	Border collie	42,5	30	16,25	5,38
Danté	Border collie	51	32,5	17,1	4,55
Sparkle	Australian Shepherd	47	32,5	16,1	4,93
Finley	Border collie	42,5	30	15,9	4,91

Fraya	Border collie	51	30	15,6	4,7
Quitta	Border collie	48	35	18,4	4,35
Fates	Belgische Herder Mechelaar	61	35	19,3	4,22
Nice	Border collie	42,5	30	14,4	4,19
Dalwing	Border collie	47	32,5	16,55	4,55
Abbey	Border collie	46	32,5	15,75	4,45
Heavy	Border collie	49	35	16,95	4,37
Fiona	Belgische Herder Tervuerense	56	35	18,4	4,94

ANNEX 2

List official Belgian measurements compared to NAFA[®]-jumpheights

Ras					Ras				
		NAFA	ulna	KKUSH			NAFA [®]	ulna	KKUSH
Jack Russell Terriër	M	17,5	7,0	17,5	Border Collie	M		16,9	32,5
Jack Russell Terriër	F	17,5	7,3	17,5	Border Collie	M		17,0	32,5
Jack Russell Terriër	M	17,5	8,2	17,5	Border Collie	F		17,0	32,5
Jack Russell Terriër	F	17,5	8,5	17,5	Border Collie	M	35,0	17,0	32,5
Jack Russell Terriër	M	17,5	8,8	17,5	Border Collie	F	35,0	17,0	32,5
Jack Russell Terriër	M	17,5	9,0	20,0	Border Collie	F		17,0	32,5
Teckel	M	17,5	9,1	20,0	Onbekend / kruising	F	35,0	17,0	32,5
Onbekend / kruising	M	22,5	9,8	20,0	Border Collie	F	35,0	17,0	32,5
Spaanse Waterhond	F	25,0	13,3	25,0	Border Collie	F	35,0	17,0	32,5
Tibetaanse Terriër	M	25,0	13,4	25,0	Onbekend / kruising	F	35,0	17,0	32,5
Border Collie	F	27,5	13,9	27,5	Border Collie	F		17,0	32,5
Border Collie	F	30,0	14,4	27,5	Border Collie	M		17,0	32,5
Border Collie	F	27,5	14,6	27,5	Border Collie	M		17,0	32,5
Border Collie	F	30,0	14,9	27,5	Border Collie	F		17,0	32,5
Border Collie	F		15,0	30,0	Border Collie	M		17,0	32,5
Border Collie	F		15,2	30,0	Border Collie	F	35,0	17,0	32,5
Border Collie	F		15,2	30,0	Border Collie	F	30,0	17,1	32,5
Border Collie	F	32,5	15,2	30,0	Border Collie	F	35,0	17,1	32,5
Border Collie	F		15,2	30,0	Onbekend / kruising	F	35,0	17,1	32,5
Border Collie	F	32,5	15,3	30,0	Border Collie	M	32,5	17,1	32,5
Border Collie	F	32,5	15,3	30,0	Border Collie	F	32,5	17,1	32,5
Border Collie	F	30,0	15,3	30,0	Border Collie	M		17,1	32,5
Border Collie	F	30,0	15,3	30,0	Border Collie	F	35,0	17,2	32,5
Border Collie	F		15,3	30,0	Border Collie	F		17,2	32,5
Border Collie	M		15,3	30,0	Border Collie	M	35,0	17,2	32,5
Australian Shepherd	M		15,3	30,0	Border Collie	M		17,2	32,5
Nova Scotia Duck									
Tolling Retriever	M	30,0	15,4	30,0	Border Collie	M	32,5	17,2	32,5
Border Collie	F	27,5	15,4	30,0	Border Collie	F	35,0	17,2	32,5
Border Collie	M	32,5	15,4	30,0	Border Collie	M	32,5	17,2	32,5
Border Collie	F	32,5	15,4	30,0	Border Collie	M		17,2	32,5
Border Collie	F		15,4	30,0	Border Collie	M	35,0	17,3	32,5
Border collie	F		15,5	30,0	Border Collie	F		17,3	32,5
Border Collie	F	32,5	15,6	30,0	Border Collie	M		17,3	32,5
Border Collie	F		15,6	30,0	Border Collie	F		17,3	32,5
Border Collie	F	30,0	15,6	30,0	Border Collie	M	35,0	17,3	32,5
Border Collie	F	30,0	15,6	30,0	Border Collie	M	35,0	17,3	32,5
Border Collie	M	35,0	15,7	30,0	Border Collie	F	35,0	17,3	32,5
Border Collie	F	32,5	15,8	30,0	Border Collie	M		17,3	32,5
					Nova Scotia Duck				
Cirneco dell'Etna	M		15,8	30,0	Tolling Retriever	M		17,3	32,5
Border Collie	F		15,8	30,0	Border Collie	M		17,3	32,5
Border Collie	F		15,9	30,0	Border Collie	M	32,5	17,4	32,5
Border Collie	F	32,5	15,9	30,0	Border Collie	F		17,4	32,5
Border Collie	F	32,5	15,9	30,0	Border Collie	F		17,4	32,5
Border Collie	F		15,9	30,0	Border Collie	M		17,4	32,5
Border Collie	F	30,0	15,9	30,0	Border Collie	M	35,0	17,5	32,5
Onbekend / kruising	F		15,9	30,0	Border Collie	M	35,0	17,5	32,5
Border Collie	M	35,0	15,9	30,0	Border Collie	M		17,5	32,5
Border Collie	M		15,9	30,0	Border Collie	M		17,5	32,5
Border Collie	F		15,9	30,0	Border Collie	M		17,5	32,5







Border Collie	F	32,5	15,9	30,0		Hollandse herder	F		17,5	32,5
Border Collie	M	35,0	16,0	30,0		Border Collie	M		17,6	32,5
Border Collie	F	32,5	16,1	30,0		Border Collie	M		17,6	32,5
Border Collie	F	30,0	16,1	30,0		Border Collie	M	35,0	17,7	32,5
Border Collie	F		16,1	30,0		Border Collie	M		17,7	32,5
Border Collie	M	30,0	16,1	30,0		Border Collie	F	32,5	17,7	32,5
Border Collie	M	32,5	16,1	30,0		Border Collie	M		17,7	32,5
Border Collie	F		16,1	30,0		Border Collie	M	35,0	17,7	32,5
Border Collie	M	35,0	16,2	30,0		Border Collie	M		17,7	32,5
Border Collie	F	32,5	16,2	30,0		Border Collie	F	35,0	17,8	32,5
	M	32,5	16,2	30,0		Border Collie	M		17,8	32,5
Border Collie	M	30,0	16,2	30,0		Border Collie			17,8	32,5
Nova Scotia Duck										
Tolling Retriever	M	32,5	16,2	30,0		Border Collie	M	35,0	17,9	32,5
Border Collie	F		16,2	30,0		Golden Retriever	F		17,9	32,5
Border Collie	M		16,2	30,0		Border Collie	M	35,0	17,9	32,5
Border Collie	F	32,5	16,3	30,0		Border Collie	M		17,9	32,5
Border Collie	F	32,5	16,3	30,0		Border Collie	M		17,9	32,5
Border Collie	F	32,5	16,3	30,0		Border Collie	M		17,9	32,5
Border Collie	F	32,5	16,3	30,0		Golden Retriever	M		18,0	35,0
Border Collie	F	30,0	16,3	30,0		Onbekend / kruising	M		18,0	35,0
Border Collie	F	32,5	16,3	30,0		Onbekend / kruising	F		18,0	35,0
Border Collie	F		16,3	30,0		Border Collie	M		18,0	35,0
Australian Shepherd	F	32,5	16,3	30,0		Border Collie	F	35,0	18,0	35,0
Border Collie	F		16,3	30,0		Golden Retriever	M		18,0	35,0
Border Collie	F	32,5	16,4	30,0		Labrador Retriever	M		18,0	35,0
Nova Scotia Duck						Nova Scotia Duck				
Tolling Retriever	F	30,0	16,4	30,0		Tolling Retriever	M	35,0	18,0	35,0
Border Collie	F	32,5	16,4	30,0		Border Collie	M		18,0	35,0
Border Collie	F		16,4	30,0		Border Collie	F	35,0	18,0	35,0
Australian Kelpie	M	35,0	16,4	30,0		Border Collie	F		18,1	35,0
Border Collie	F		16,4	30,0		Border Collie	M	35,0	18,1	35,0
Border Collie	M		16,4	30,0		Border Collie	M		18,1	35,0
Border Collie	F	32,5	16,5	30,0		Border Collie	M	35,0	18,1	35,0
Border Collie	M		16,5	32,5		Border Collie	M	35,0	18,1	35,0
Border Collie	F		16,5	32,5		Border Collie	M		18,1	
Border Collie	F	35,0	16,6	32,5		Border Collie	M	-	18,1	35,0
Border Collie		32,5	16,6	32,5		Border Collie	M	35,0	18,2	-
Border Collie	F		16,6	32,5		Border Collie	M		18,2	35,0
Border Collie	F		16,6	32,5		Border Collie	M		18,2	35,0
Border Collie	F	35,0	16,6	32,5		Border Collie	F		18,2	35,0
Border Collie	F		16,6	32,5		Border Collie	M	35,0	18,2	35,0
Border Collie	M		16,7	32,5		Border Collie	M	35,0	18,2	35,0
Border Collie	F		16,7	32,5		Border Collie	M	35,0	18,2	35,0
Border Collie	F		16,7	32,5		Border Collie	M	35,0	18,3	35,0
Border Collie	M		16,7	32,5		Border Collie	M	35,0	18,3	35,0
Australian Shepherd	F	32,5	16,7	32,5		Border Collie	M	35,0	18,3	35,0
Border Collie	F		16,7	32,5		Border Collie	M	35,0	18,3	35,0
Border Collie	F		16,7	32,5		Border Collie	F	35,0	18,3	35,0
Border Collie	M		16,8	32,5		Border Collie	M	35,0	18,3	35,0
Border Collie	M		16,8	32,5		Border Collie	F		18,4	35,0
Border Collie	F		16,8	32,5		Border Collie	M	35,0	18,4	35,0
Border Collie	F		16,8	32,5		Border Collie	M		18,4	35,0
Border Collie	F	35,0	16,8	32,5		Onbekend / kruising	F		18,4	35,0
Border Collie	F	35,0	16,8	32,5		Border Collie	F	35,0	18,4	35,0
						Belgische Herder				
Border Collie	F	35,0	16,8	32,5		Tervuerense	F	35,0	18,4	35,0

Border Collie	F	35,0	16,8	32,5	Border Collie	M	35,0	18,5	35,0
Border Collie	M	35,0	16,8	32,5	Border Collie	M	35,0	18,5	35,0
Border Collie	M	35,0	16,8	32,5	Border Collie	M	35,0	18,6	35,0
Border Collie	M	35,0	16,8	32,5	Onbekend / kruising	F		18,6	35,0
Border Collie	F		16,8	32,5	Border Collie	M	35,0	18,8	35,0
Border Collie	F		16,8	32,5	Border Collie	M	35,0	18,8	35,0
Australian Shepherd	M		16,8	32,5	Australian Shepherd	M	35,0	18,9	35,0
Border Collie	F		16,8	32,5	Labrador Retriever	M		19,0	35,0
Border Collie	M		16,8	32,5	Grote Münsterlander	M	35,0	19,0	35,0
					Belgische Herder				
Border Collie	M		16,8	32,5	Mechelaar	F	35,0	19,0	35,0
Border Collie	M	35,0	16,9	32,5	Border Collie	M	35,0	19,1	35,0
Border Collie	F	30,0	16,9	32,5	Border Collie	M		19,2	35,0
Border Collie	M	32,5	16,9	32,5	Onbekend / kruising	F	35,0	19,3	35,0
					Belgische Herder				
Border Collie	F	35,0	16,9	32,5	Mechelaar	M	35,0	19,3	35,0
Border Collie	F		16,9	32,5	Labrador Retriever	M		19,4	35,0
					Belgische Herder Mechelaar			19,8	35,0
					Belgische Herder Mechelaar	F		19,8	35,0

ANNEX 3

List Czech measurements compared to jump height by shoulder

breed	shoulder	jump height by shoulder	ulna lenght	breed	shoulder	jump height by shoulder	ulna lenght
yourkshire	24	17,5	8	border collie	47	32,5	15,2
yourkshire	22	17,5	8,5	border collie	43	30	15,5
dwarf pinscher	28	17,5	9	Longhaired Whippet	46,5	32,5	15,5
Jack Russell terrier	28	17,5	9	border collie	50	35	15,5
mix	29	17,5	9,5	border collie	51	35	15,5
poodle	29	17,5	10	border collie	48	35	15,5
mini schnauzer		17,5	10	border collie	46	32,5	15,5
Parson Russel Terrier	33	20	10	border collie	46,5	32,5	16
mini schnauzer	31	17,5	10,3	border collie	46	32,5	16
sheltie	34	20	10,4	border collie	49	35	16
sheltie		20	10,7	border collie	48	35	16
sheltie		20	10,7	Australian kelpie	48,5	35	16
mix	34	20	11	border collie	48	35	16
mini schnauzer	33	20	11	Australian kelpie	49	35	16
Parson Russell Terrier	37	22,5	11	border collie	49	35	16
mix	36,5	22,5	11	border collie	49	35	16,2
sheltie	35,5	22,5	11	border collie	49,5	35	16,4
Jack Russel Terrier	25	17,5	11	border collie	47	32,5	16,5
Papillon	28	17,5	11,5	border collie	50	35	16,5
Parson Russel Terrier	34	20	11,5	border collie	48	35	16,5
poodle	33	20	11,5	border collie	48	35	16,5
Parson Russel Terrier	35	22,5	11,5	border collie	51	35	16,5
Parson Russel Terrier	36	22,5	11,5	border collie	52	35	16,5
mix	33	20	12	border collie	53	35	16,5
Boston terrier	40	27,5	12	border collie	53	35	17
mix	39	25	12,5	Am.Staffordshire Terrier	51	35	17
smooth foxterrier	37	22,5	13	border collie	49	35	17
English Cockerspaniel	39	25	13	border collie	52	35	17
mix	40	27,5	13	border collie	48	35	17
mix	38	25	13,3	border collie	49	35	17
Parson Russell Terrier	35,5	22,5	13,5	border collie	52,5	35	17,2
border collie	44	30	13,5	border collie	50	35	17,9
Parson Russell Terrier	37	22,5	14	border collie	54	35	18
mix	39	25	14	border collie	51,5	35	18
Staffordshire Bullterier	43	30	14	border collie	54	35	18
border collie	48	35	14	border collie	54,5	35	18
border collie	44	30	14,5	border collie	55	35	18
border collie	47	32,5	14,5	smooth collie	57	35	18
sheltie	41	27,5	15	border collie	51,5	35	18
smooth foxterrier	43,5	30	15	border collie	55	35	18,5

border collie	44	30	15		golden retriever	59	35	19
border collie	45	32,5	15		border collie	55	35	19
border collie	45	32,5	15		border collie	53.5	35	19
border collie	50	35	15		border collie	46	32,5	20
border collie	48,5	35	15		mix	58,5	35	20
					mix	61,5	35	>20