A new Angle on Alpaca Conformation

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Introduction

Now that our alpacas have been shorn, it is the best time to assess their conformation.
Conformation can be defined as the shape or contour of an animal, resulting from the appropriate arrangement, or balance, of all body parts. [1] It should not be confused with *anatomy* or *morphology*, which is the form and structure of organisms. [2] All alpacas have the same anatomy but individuals differ by their conformation. In particular, conformation is what gives an animal its *type*. Conformation is also very important to the health and well-being of the animal and is discussed in breed standards. [4,5,7,8,10,14]
The terminology used to describe conformation is rich, precise, poetic, often confusing, and sometimes redundant. There are basically two descriptive jargons: the veterinary / biologic terminology and the more current breeders' terminology.
In this article, I will try to offer a new angle on alpaca conformation by concentrating on what is normal (the ideal conformation), rather than abnormal, with an emphasis on conformation of the limbs.

Ideal alpaca conformation

Figure 1 is a diagram of the ideal conformation of an alpaca. The proper (anatomical) terminology is set out in Figure 2.

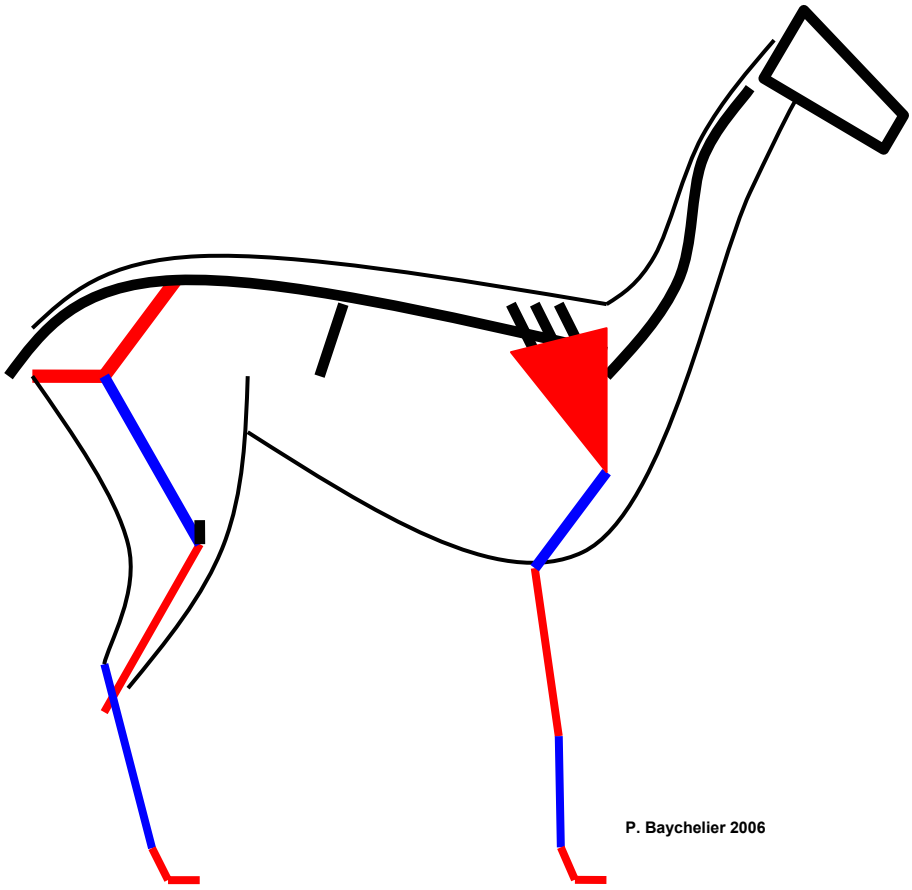

Figure 1 – Ideal alpaca conformation

Some important points should be noted. A few names have been assigned to some animal body parts because they resemble areas in the human body; however they are not the analogous animal counterparts of the human structures. For example the *knee* is really a wrist (carpus), and the *ankle* is actually the metacarpo-phalangeal joint (or metatarso-phalangeal joint for the hind limb). The real knee is called the *stifle* and the real ankle (tarsus) is called the *hock*.

The *withers* correspond to the region between the two shoulder blades. The *back* follows the withers and becomes the *loins* beyond the last rib. The *rump* or *croup* corresponds to the sacrum and is always very bony in alpacas. The expanded *iliac crests* which can be felt under the alpaca rump are one of the Camelid adaptations to allow for the pacing gait.

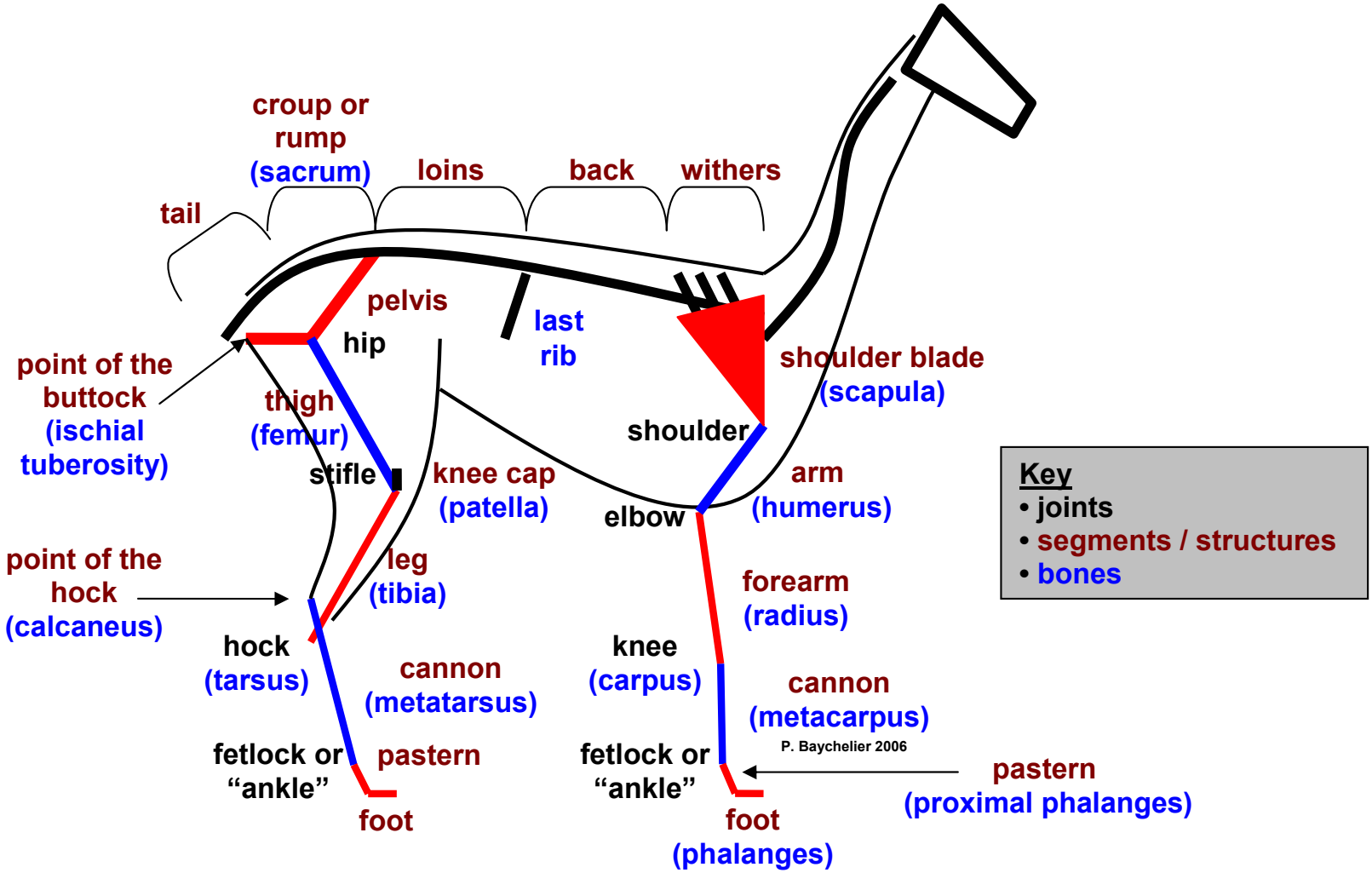

Figure 2 – Essential anatomical terminology

Figures 3 and 4 illustrate the important proportions, ratios and angles which form the basis of the ideal alpaca conformation. The most original alpaca characteristic is that the hindquarters are only slightly higher than the forequarters, as all Camelids have fore and hind limbs of approximately equal length. [11]

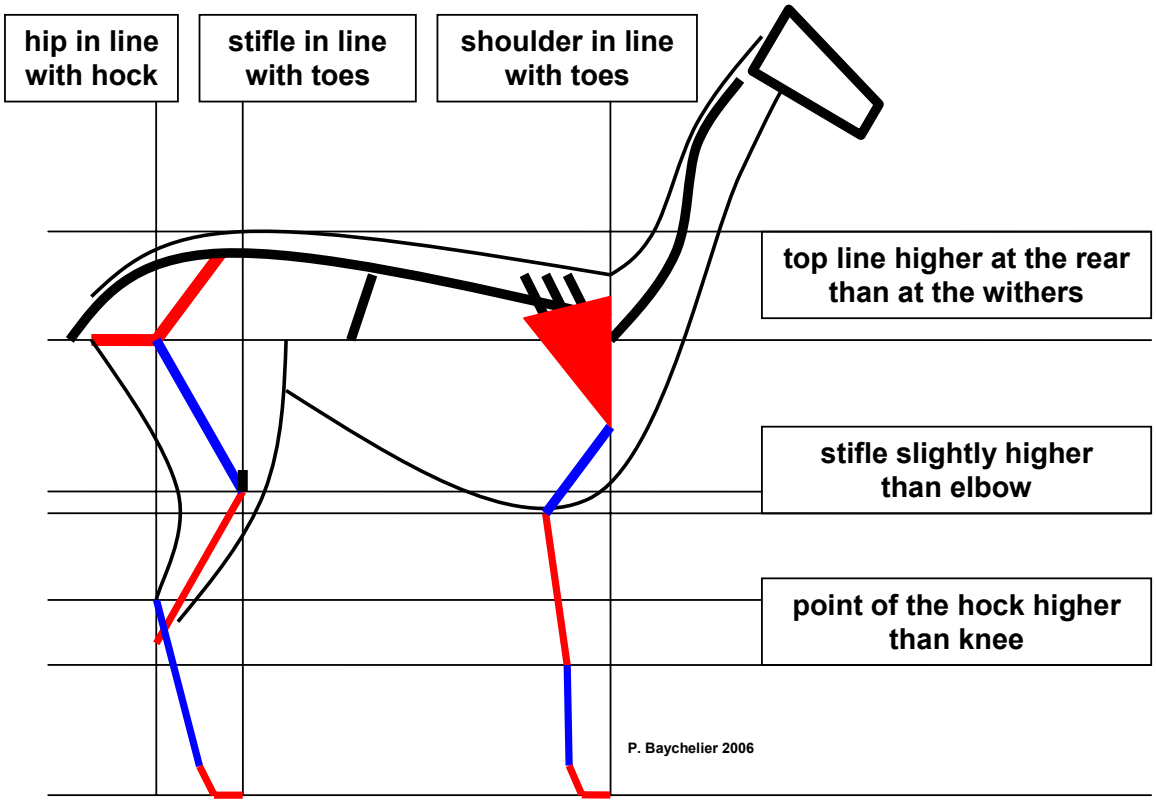

Figure 3 – Ideal alpaca proportions

In Figure 4, distance **D** is the distance between the *point of the buttock* and the ground and it should be equal to the distance between the *hip* (or the *hock*) and a vertical line through the *shoulder joint*. Distance **d** is the distance between the *elbow* and the ground. It should be equal to the depth of the body, and to the length of the neck (up to the *occipital protuberance*). However, in crias this is not the case, as the distance between the elbow and the ground is approximately twice the depth of the body.
Distance **d** is approximately ⅔ of distance **D**. More exactly, on Figure 4, the ratio **D** / **d** is 1.62. This is a very common ratio in natural structures, and has been used for centuries by architects and artists to achieve ideal proportions in their work. It is called *phi* (φ), the Golden Ratio or Divine Proportion.
The alpaca pelvis forms a 50° to 60° angle with the horizontal. The pastern angle is at least 65° to 70° to the ground, and even more, especially for the front pastern (up to 80° to nearly vertical). When resting, the neck and head should be held at approximately 25° to the vertical. Normal angulation of the hock should be approximately 140°. [1,3,9,10,13,14]

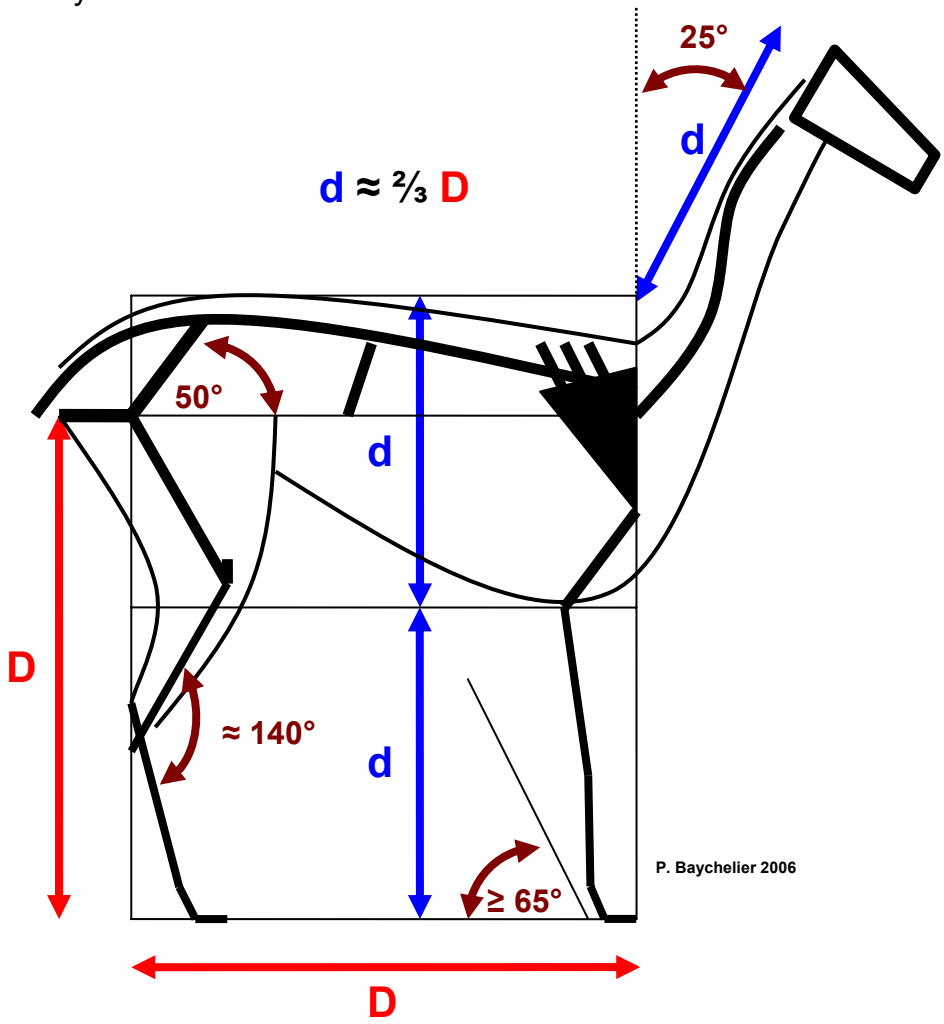

Figure 4 – Ideal alpaca ratios and angles

The height *at the withers* in an adult alpaca should be approximately 90 cm but can vary from 75 to 102 cm, depending on sex and country of origin. [1,9,10,14]

Front and rear views are not illustrated as it is easy to understand what the ideal alpaca conformation should be: "Viewed from the front, a plumb line held at the point of the shoulder should bisect each bone and joint from the knee down, and the plumb bob should end between the toes. Viewed from the rear, a plumb line held at the *pinbone* [other name for *point of the buttock*] should approximately bisect each bone and joint and the plumb bob should end between the two pads of the rear foot." [1]
Similarly, conformation of the head and other parts of the body such as genitalia are not illustrated. The reader is asked to refer to other easily available publications for further descriptions. [1,3,5,7,8,10,14]

Conformational faults

The majority of the common conformational faults affecting the limbs can easily be understood by referring to the joint involved. In these faults, the joint is either in hyperflexion, in hyperextension, or is angled in a plane in which it is not designed to normally move. The latter point deserves an explanation. In Ungulates, of which alpacas are members, the limbs display a number of modifications that adapt them for speed. There are essentially three modifications:

(i) elongation of the segments;
(ii) reduction of the number of bones in each segment to only one main bone;
(iii) transformation of the joints into pulley-like structures which greatly reduce or totally eliminate lateral movements. [6]

Sometimes these joints are not formed properly and result in lateral movement or permanent lateral deviation. The names of the most common conformational faults affecting the limbs are found in Table 1.

Table 1 – Conformational faults affecting the limbs

Joint	Hyperflexion	Hyperextension	External deviation *	Internal deviation *
Shoulder	Camped rearward in front	Camped forward in front	Base-wide (external deviation of the whole limb at the shoulder)	Base-narrow (internal deviation of the whole limb at the shoulder)
Elbow		Straight-legged (hyperextension of elbow and shoulder)	Out at the elbow	In at the elbow
Knee	Buck-kneed	Calf-kneed, Sheep-kneed	Bow-legged (carpal varus)	Knock-kneed (carpal valgus)
Fetlock (front or rear)	Cocked ankle	Down on fetlock, dropped fetlock, weak pastern	Pigeon-toed, toe-in	Splay-footed, toe-out
Hip	Camped forward behind	Camped rearward behind	Base-wide (external deviation of the whole limb at the hip)	Base-narrow (internal deviation of the whole limb at the hip)
Stifle	Crouched (resulting in rear quarters lower than withers)	Post-legged	"Out at the stifle"	"In at the stifle"
Hock	Sickle-hocked		Bow-legged (tarsal varus)	Cow-hocked (tarsal valgus)
Knee cap			Lateral patella luxation	Medial patella luxation

* in the frontal plane
Yellow cells indicate serious faults.

Discussion

It is of the utmost importance to the health and well-being of alpacas that breeders know and understand the basic anatomy of their animals. It is only by knowing what is normal and desirable that one can recognise what is abnormal and undesirable. Knowing the term(s) used to describe a conformational fault is not as important as being able to identify it. Current standards focus too much on listing conformational faults and do not describe the ideal alpaca conformation in sufficient detail. [5,7,8,10,14] Essential anatomical terms are not always defined. Moreover, these standards are sometimes incorrect or at least confusing, as illustrated by the following examples.

The chest is not broad, but deep and narrow. The rump is not broad either, but also narrow. In fact, Camelids are amongst the most narrow-chested and narrow-rumped Ungulates and this is one of the reasons why they can pace naturally: "Camelid limbs are set more closely to the midline than in other species, eliminating some of the side to side rolling that occurs when the center of body gravity is changed with each stride." [3] Other anatomic modifications found in Camelids which allow them to pace naturally include: long front and hind limbs of approximately equal length and longer than the trunk, absence of skin fold attaching the thigh to the flank, small abdomen ("tucked-in belly"), broad flat ribs, expanded iliac crests, large scapula, and a unique splayed two-toed padded foot. [3,11] All these characteristics put together allow for a longer stride and increased lateral stability.

The height of the pinbone does not equal that of the shoulder. The pinbone (or point of the buttock) and hip are substantially higher than the shoulder. The term shoulder refers to a joint. Unfortunately *shoulder* is sometimes used to describe the entire shoulder blade area. In any case, the pinbone is higher than the shoulder *joint* and lower than the top of the shoulder *blade* (see Figure 3).

It is also generally assumed that the toes should be pointing forward, an especially useful indicator of correct conformation on heavily fleeced animals. [12,13] For example, J. Ault states: "The toes should point forward. An indication of normal conformation would be toes that point forward. Toes that do not point forward may indicate poor conformation or poor toenail trimming. In either case, toes that point forward are important to structurally sound animals." [12] This is not entirely correct. Although the axis of the foot does point forward, the toes do not necessarily point forward but can form a slightly open V. The toes on each foot are not always parallel to each other, as the Camelid foot is splayed. This is more pronounced on the front foot than on the rear foot.

Some authors recommend that the line dropped from the point of the buttock should touch the back of the hock and that the rear cannon should be vertical. [13] Our observations lead us to believe that this is a llama characteristic. An alpaca with such a conformation would be considered as camped rearward in the hind legs. The drawings and descriptions found in other references certainly suggest that alpacas are "conformationally under themselves", compared to llamas. [9] The difference in angulation of the pelvis (50-60° in alpacas vs. 40° in llamas) and of the pastern (at least 65° in alpacas vs. 45-50° in llamas) certainly support this important difference in conformation. [1,3]

Conclusion

Breeders should spend time studying and understanding the anatomy and observing the conformation of their shorn animals. Repeated observation and objective assessment are the best means for developing an "eye" for conformation and will help in the selection of superior animals. As recommended by Dr Karen Timm, "when choosing or evaluating alpacas, […] leg conformation as close to ideal as possible should be a primary consideration." [13]

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