



When Should I Rug?

By **The Nude Horse**
(Equine Epidemiologist)

The natural design of equine coats

The major player in the hair coat cycles appears to be the changing length of daylight or photoperiod. The daily photoperiod effect on hair growth cycles brings the brain into the act. Light signals are routed biochemically to the pineal gland, the hypothalamic part of the brain and the pituitary gland. From there the control is hormonal.

It has been shown that horses wearing rugs and/or stabled in heated barns **fail to develop** a complete winter coat. It has been hypothesized that domestication (heated barns, rugging, rapid changes in geographic location and mares standing under artificial light) might cause a change from a single yearly shed as observed in the undomesticated horse to continuously shedding throughout the year, maintaining a short coat year-round.

There is a primary coat known as the outer or "guard" coat and a secondary coat known as the inner coat. It has been reported that there are approximately 800-1,200 primary hairs and from 1,200-2,000 secondary hairs per square inch of skin in the horse. A horse's hair coat changes with the seasons; therefore, the ability of the hair coat to regulate body temperature is related to its length, thickness and density per square inch of surface area of skin. One major factor in the hair's ability to serve in thermoregulation is the ability of a small muscle associated with every hair follicle under control of the nervous system to pull the hairs to a standing "puffed-up" position (piloerection). The physiological process of piloerection increases the insulating factor of the hair coat by increasing the air content within the hair coat and therefore the skin and the environment. It's like putting on a winter doona.

Rugs prevent horses from exfoliating their skin properly (by rolling and mutual grooming etc.) So a rugged horse must be groomed thoroughly and frequently to get rid of the build-up of dead skin and hair.

Making the most of hair growth periods

Research indicates that the greatest rate of growth occurs during the autumn in readiness of the cold. Hence rugging during this season inhibits the natural ability to grow its natural dense winter secondary hairs that protect them from the cold.

Vitamin D deficiency

Rugging a horse, eliminates the ability of the skin to take up Vitamin D from natural sunlight.

Direct sun exposure is the best way to absorb vitamin D. Recent studies demonstrate that with the absence of Vitamin D, alopecia can develop.

<https://www.ncbi.nlm.nih.gov/pubmed/17223342>

Modern practises of rugging horses sometimes continuously may predispose the horse to suboptimal intakes of vitamin D. Restricting turn out time for sun exposure will fail the body having time to convert vitamin D in the skin.
<https://ker.com/equine/vitamin-d-equine-diets/>



Karen Langston for the National Association of Nutrition Professions says "Vitamin D maintains blood calcium levels and it regulates calcium and phosphorus, which keeps bones and teeth hard. Vitamin D deficiency - The biggest concern is softening of the bones... weak muscles, bone pain and tenderness".

At trial low serum levels of vitamin D appear to be associated with an increased risk for progression of osteoarthritis of the knee. <http://annals.org/aim/article-abstract/709914/relation-dietary-intake-serum-levels-vitamin-d-progression-osteoarthritis-knee>

"Vitamin D plays an essential role in maintaining a healthy mineralized skeleton for most land vertebrates. Vitamin D keeps the serum calcium and phosphorus concentrations within the normal range to maintain essential cellular functions and to promote mineralization of the skeleton."
https://academic.oup.com/jn/article/126/suppl_4/1159S/4724783

Dr Juliet M Getty explains: "Reduced appetite, slowed growth, phytitis in growing horses, bone demineralization (leading to stress fractures and bone deformities), and poor muscle contraction, are deficiency outcomes. Horses do best when they receive at least 6.6 IU of vitamin D per kg of body weight. For an 1100 lb (500 kg) horse, this translates into 3300 IU/day. **Sunlight exposure – 5 to 8 hours/day** – under optimal conditions, will produce this amount of vitamin D.
<http://gettyequinenutrition.biz/Library/VitaminDTheSunshineVitamin.htm>

More from Dr Getty "For a horse, the hair coat alone creates such a significant barrier to absorption that it typically takes five to eight hours of exposure to ultraviolet light for horses to produce enough vitamin D to satisfy the daily requirement. Compound that with additional barriers like rugging, fly spray, coat conditioners or decreased oils from bathing, it become apparent a horse may not be getting enough vitamin D."

Frequent bathing with soap inhibits the body's ability to produce vitamin D simply because the precursor (7-dehydrocholesterol) is washed away.

Dr Claire Thunes PHD suggests "those with limited exposure to sunlight get fed levels of vitamin D that meet the current NRC guidelines. You can achieve this by selecting a fortified commercial feed or supplement that provides about the

guaranteed levels of vitamin D, and then feed the correct amount.”

<https://thehorse.com/19730/do-horses-need-vitamin-d-supplementation/>

Achieving a sleek coat without a rug

Experts already know that there is a strong link between hair loss/growth and nutrition.

Healthy hair growth occurs when dietary needs are met adequately, supplying the necessary building blocks for the natural biological processes to occur according to genetic makeup.

Hair follicles are metabolically active tissues that require nutrients to support both structural and functional activities (Galbraith, 1998). As such nutrition has a profound effect on both its quality and quantity. Poor nutrition may produce and therefore be reflected by a dull, dry, brittle or thin hair coat. Colour disturbances may also occur. Nutritional factors that influence hair growth are very complex and can be *interrelated*.

The most important requirement for hair keratin synthesis is the amino acid cysteine, as it is ultimately oxidized to form the stable disulphide bonds that give keratin its structure, strength, and stability. Horses, like non-ruminants are *unable to absorb inorganic sulphur* and must meet their sulphur requirements through *organic forms such as methionine*. (Lewis,1995). **Methionine** can be converted to cysteine in the liver. Source a feed supplement high in Methionine for added growth rates.

Zinc is an essential element to many metalloenzymes and metabolic processes including keratogenesis. Studies show the fractional absorption over this range of ingested zinc averages ≈ 0.4 when ingested from non-organic forms. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2854914/>.

Sourcing bioavailable forms such as organic and chelated zinc clinically shows better absorption rates. <http://onlinelibrary.wiley.com/doi/10.2903/j.efsa.2008.694/pdf>

Copper. This element is essential in various enzyme systems including those involved in melanin synthesis, keratin synthesis, and disulphide bond linkage (Jarrett, 1977; Underwood, 1977). Copper deficiency results in fibre depigmentation and loss of hair tensile strength and elasticity leading to breakage.

Selenium performs several roles pertaining to cellular function and is a necessary constituent of the diet for healthy hair growth.



Your goal should be to achieve a new richly coloured and glossy coat in Spring. Why? Glossiness of coat hair is also important in reflecting solar

radiation. Tropical breeds tend to have glossy coats that reflect solar radiation well (Hayman and Nay, 1961; Holmes, 1970).

Nutrients commonly associated with poor hair quality and hair loss have been summarized by Lewis (1995). They comprise dietary **deficiencies** of protein, phosphorus, iodine, zinc, and vitamins A and E, as well as dietary **excesses** of selenium, iodine and vitamin A. Other possible nutritional imbalances that can affect hair growth include B-vitamin and vitamin C deficiencies, copper and cobalt deficiencies and molybdenum toxicoses (Scott, 1988).

Do I need to rug in changing season?

“The horse has various mechanisms to keep warm or cool down (e.g. shivering, sweating, changing its metabolism) and these are controlled by the brain. The brain makes its decisions based on signals from both the inside of the horse and from its skin surface, which give information on cold/hot the horse is and how cold/hot the environment is. These signals are crucial to allow the brain to make the correct decisions about how to control body temperatures, and it is thought that over rugging can interfere with this mechanism by changing hormone levels.” <http://equinefreelance.com/free-articles/rugging/>

Potential for Disease when rugged

“I checked under his rug (a waterproof one) every couple of days...I was shocked to find one morning, that his quarters and loins had crops of scaly white scabs dotted all over...the scabs came off with clumps of hair...the vet confirmed my suspicion – rain rot. He advised me...no more rug. He said...quite a few rugged horses have got it because of the dampness getting in.” <https://www.angloinfo.com/brittany/discussions/pets-animals/horse-rugs-and-rain-rot>

“Rain Scale – is a bacterial infection affecting areas of skin which are moist, hence it is a widespread problem. The back, lower limbs and areas of coat drainage and under rugs that are wet due to sweat are commonly affected. Rugging seems to cause more harm than good.” <http://www.clydevetgroup.co.uk/equine/newsletters/dec04.htm>

Rugging in Summer

It is much harder for a horse to stay cool than it is for it to stay warm. The horse maintains its core body temperature (inside) within a very narrow range. If this changes more than 1°C then the horse experiences discomfort, and if it changes too much then the horse dies.

It is NOT possible to tell if a horse is too hot or too cold simply by feeling the skin temperature. The horse can increase circulation to the skin or constrict blood vessels to help regulate core temperature.

The RSPCA states “Using rugs on horses in summer can be a welfare issue. Rugs do not keep horses cool. A horse naturally has a **sleek coat which reflects the sun** and a horse will seek shade when they are hot as a natural response. All large bodied animals, such as horses, take longer to cool

down (and warm up) than smaller bodied animals. Rugs prevent any cooling breeze from cooling the body. Horses are one of the few animals that rely on sweating to cool down and rugs impede this process (by preventing air from passing over the body, evaporating the sweat and cooling the body)."

http://kb.rspca.org.au/Do-I-need-to-rug-my-horse_465.html

"Rugging leads to overheating, and this leads to heat stress, which can:

1. Damage body cells and tissues
2. Affect the body's immunity to disease
3. Decrease growth and healing
4. Cause electrolyte imbalances
5. Reduce thyroid gland function (and the ability of the horse to control its own body temperature)
6. Cause problems with sperm, embryo development and lactation in breeding horses
7. Lead to obesity, particularly if owners also feed the horse more because the weather is cold"

<http://equinefreelance.com/free-articles/rugging/>

Rugging in Winter

It is NOT possible to tell if a horse is warm enough by feeling the temperature of the skin in the wintry weather; because the horse will constrict the blood vessels near the skin and the horse's insulating fat layer is *below* the skin surface. It is a myth that having cold ears means that the horse is cold. The horse will have cold ears if the rest of the body is cold but can also have cold ears when the rest of the body is warm. Difference in skin temperature is partly due to the horse's efficiency in controlling its own body temperature. <http://equinefreelance.com/free-articles/rugging/>

The RSPCA states: "The coat of an un-rugged horse stands up in chilly weather to trap air and warm the horse.

Thermoregulation is the ability of a small muscle associated with every hair follicle under control of the nervous system to pull the hairs to a standing "puffed-up" position (piloerection). If you decide to rug you have to compensate for this mechanism as a rug will stop the hair from being able to do its job. In some circumstances a rugged horse is actually colder than an un-rugged horse if it is a thin rug that flattens the hair and reduces the movement of the horse without providing any real warmth."

"Horses are very efficient at controlling their core body temperatures when the environmental temperature is between 5 to 25 °C and in winter they can acclimatise to a wider range, e.g. down to -15°C. In general horses can comfortably maintain their body temperature without feeling hot or cold if the environment is between the above limits. During winter they acclimatize to colder temperatures, so long as this change isn't sudden (it takes weeks for the horse's hormones to adjust) and can still be

comfortable down to -10 to -15°C if they are dry and not in cold winds." <http://equinefreelance.com/free-articles/rugging/>

They stay warm from the carbohydrates they consume.

Fermentation of the forage produces heat, so the horse effectively has a large in-built heater inside its gut generating heat from its digestion. The more hay or grass he eats then the more heat is produced.

It is not possible to tell if a horse is warm enough by feeling its skin.

The truth is if the ambient temperature drops below the horse's comfort zone (5°C to 24°C) it will:

- Seek Shelter
- Increase muscle tone/shiver
- Trap a layer of air within its coat by raising the hairs (piloerection). This helps insulate the horse against cold – it is a normal coping mechanism and does not mean that the horse needs to be wearing a rug, just that it is maintaining its body temperature. However, some owners don't like their horses to look 'fluffy'.
- Change the metabolism. The horses can breakdown stored energy supplies (e.g. Fat) and increase various other aspects of its metabolism to produce heat.
- Eat more. This is one of the key methods by which a horse can increase its body temperature.
- Move around more.

Wet Rugs

Wet rugs can be worse than no rugs, as they increase the heat loss from the body (via contact with a cold wet surface and prevent the horse's normal mechanisms working properly (e.g. can't raise the hair coat for warmth).

Shelter

As recommended by the RSPCA (via The Equi-Central System) rugs are not usually required because the horses should have access to shade and shelter from heavy rains, cold winds and extreme heat conditions. <https://www.equiculture.net/p/responsiblehorsecare>

When to rug

It makes sense to rug

- a horse that is severely malnourished & underweight
- A thin elderly horse who can no longer self-regulate their temperature
- An itchy horse from dusk to dawn, protecting from biting insects who come out at these times
- Preparing coats for imminent shows