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Veterinary

Nature vs. Nurture:

What Shapes a Foal's Future?

We can strive to optimize both "nature and nurture" with our breeding and management efforts, but there are still many factors that shape a foal's demeanor that are out of our hands.

Once a foal hits the ground, what factors—from genetics to environment to relationships with other horses—ultimately impact his temperament and traits?

What a cutie, that beautiful newborn foal! And he looks just like his talented full sister—same coloring, same big, soft eyes and inquisitive ears. He's going to grow up to be just like her: brave, interested, and willing ... right? Well, maybe not.

Researchers have discovered that genes are certainly responsible for many personality traits. But even full siblings don't share all the same genes. And, more importantly, one foal's world can vary greatly from another's. The environments and experiences and relationships in those different worlds can significantly impact a young horse's demeanor and help shape him—for better or for worse—for life.

So what affects a foal's demeanor and makes him his own, unique self? Let's have a look at what science has to say.

Genetics

Personality's definitely in the genes—there's no doubt about it. Scientists have recently confirmed that at least two aspects of equine personality pass down through genetics: fearfulness and tactile sensitivity, says Lea Lansade, PhD, of the National Institute for Agricultural Research's behavior science department, in Tours, France.

"We've known for a few years now that fearfulness comes through the genes, and our newest studies are showing that sensitivity to touch does, as well," she says. So do curiosity and vigilance—which might be subspects

of fearfulness—say Japanese researchers. They found that a single nucleotide polymorphism (a DNA sequence variation) on the equine genome, specifically on a dopamine receptor called DRD4, appears to affect these two traits.

Dopamine is a natural chemical in the nervous system that plays an important role in how horses behave socially and develop personality, says Yusuke Hori, PhD, a researcher in the department of psychology at Kyoto University, in Kyoto. His team found that DRD4 receptors were associated with consistent fundamental differences among horse breeds, suggesting they inherit dopamine-related personality traits.

Studies at the Graf Lehndorff Institute for Equine Science, in Neustadt, Germany, in collaboration with the Swiss National Stud, in Avenches, also confirm personality's heritability. A team compared foals from 50 embryo transfers with their recipient mares (that foaled them) and their blood relatives. "The results showed that, generally, the embryo transfer products resembled their genetic parents in their behavior much more than their recipient mares," says Christine Aurich, PhD, head of the institute.

Add to that the fact that different sire and dam combinations can lead to major genetic differences among half-siblings. Yet, full siblings acquire different genes from each parent, and those genes can "activate" or not depending on the environment—starting from the womb—says Robin Foster, PhD, certified applied animal





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behaviorist and certified horse behavior consultant, based in Seattle, Washington. “Just because the gene is there doesn’t mean it gets turned on, necessarily,” she says.

Leader of the Pack

Research shows that one of the most important factors in determining a domestic weanling’s dominance level is his age, says Martina Komárková, PhD, of the Institute of Animal Science’s Department of Ethology, in Prague-Uhrineves, Czech Republic. And while dominance itself might not be a personality trait, it often opens doors to traits such as boldness and assertiveness.

Researchers have found that older foals in a herd are typically more dominant—and this hierarchy is long-lasting.

Even just a few months’ age difference is significant in foals going through substantial growth periods, she says. Older foals in a herd are bigger and stronger, so they usually come out on top in conflicts. They’ve also had

more time to develop herd social skills and learn from their experiences.

These differences are long-lasting, she adds. Her group’s study horses showed age-related social rankings at three years of age.

Sex differences also play a role in how a horse or foal behaves, says Foster. “Colts and fillies do seem to have different activity levels, play styles, and time budgets (the specifics of how they spend their days).”

We might be surprised, though, about how sex differences affect temperament. “We hold stereotypes related to those sex differences and project them onto the foal, but as far as personality goes, our observations have shown us that the effects are actually weaker than we imagined,” Foster says.

You Are What You Eat

What and how foals eat can also come into play. While there’s very little research on it, scientists suspect a link between nutrition and personality development. “We know that omega-3 fatty acids and tryptophan amino acids can affect emotion and learning, but it’s still too

early to define those effects,” Lansade says. “What we can say at this point is that there’s probably a link, and feeding related foals differently could lead to differences in personality traits.”

Birth season and “good” forage years can also have indirect nutritional effects on personality, Foster adds. “If you have a foal that can start grazing more independently earlier, like a spring or summer foal, than a foal that’s reliant on the mare’s milk for a long time, you can have a more independent foal that’s probably going to wean earlier,” she says.

Like Dam, Like Foal

Is a foal likely to grow up acting like his dam? Researchers have shown that he will probably pick up some of the traits she models. One of those is activity level, says Aurich. In her institute’s work on embryo transfer foals, they saw a distinct link between activity level of the transfer foals and their recipient mares. The more active the recipient mare, the more active the foal, she says.

A foal is also going to pick up on his dam’s (or recipient mare’s) attitude toward humans, says Séverine Henry, PhD, lecturer of animal behavior at the University of Rennes, in France. In particular, dams that are aggressive toward humans shortly after foaling are likely to pass on that aggressiveness toward humans to their foals, and the effects could be long-lasting. (Better then to leave

these mares alone as much as possible until the post-foaling aggressive period subsides, she adds.)

Whatever genetic differences in personality exist, they can affect the mare-foal dynamic, which then leads to further personality-shaping, says Foster. Some foals and mares just “click” from the start, and others don’t. When they do click, it creates a more harmonious connection, but when they don’t, the relationship can be conflictual or even lead to insecure mare-foal attachment, which can affect the foal’s future social behavior. So, the way that primary mother/offspring relationship develops can shape the kind of individual the foal becomes.

The mare’s status in the herd also affects the mare-foal relationship, Foster adds. “Lower-ranked mares tend to get interrupted (when doing almost anything, but particularly nursing) by higher-ranked mares, so you have a difference in the duration and frequency of suckling, for example,” she says. In a broodmare herd that stays the same year to year, this mare/foal relationship could seem more consistent across each mare’s foals, but if the broodmare herd dynamic changes, that mare-foal bond might differ from one year to the next.

Horse-Horse Relationships

Even in relatively stable herds, there’s turnover in herd dynamics and populations, with older foals leaving and younger foals coming in. New mares might join the



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“A foal growing up in a very stressful environment can become fearful, even if his genes are lined up to make him not fearful.”

Dr. Lea Lansade

field and even a retired gelding or two. So from year to year, different foals will face different horses, creating different interactions and relationships.

“Each foal can have a really different social network and set of social experiences compared to older siblings,” Foster says. “That micro-social network has an important, long-lasting impact on the foal’s hierarchical status and personality.”

Studies have confirmed that the way we interact with foals has a significant effect on the kinds of individuals they become.

The Horse-Human Relationship

Studies have confirmed it—the way we interact with our baby horses has a significant effect on the kinds of individuals they become.

While we might plan to treat every foal the same, the truth is we ourselves evolve from year to year. We read and learn new things, try different approaches, and have evolving levels of availability or even physical capabilities when dealing with our new young stock. And we can’t deny the reality of personal affinity either—just with mares, some foals and humans simply “click” more than others. If we get along better—or worse—with one foal than another from the start, that’s going to affect the way we interact with that foal, which will affect that relationship, which will then ultimately affect that foal’s demeanor, Foster says.

And as we’ve learned, foals will pick up on their mothers’ relationships with humans and imitate that, says Henry. “Not having a good relationship with the mare is certainly an obstacle to a human developing a good relationship with her foal,” she says.

But, she recommends keeping your hands off the foal in the first few days of life, regardless of the mare’s temperament. Henry’s studies on “imprinted” foals—those handled intensively immediately after birth—revealed that they were less social with other foals and

less likely to explore their surroundings or split from their mothers, even at six months of age, when compared to foals that were not imprinted. This lack of handling didn’t spell problems for those foals that had seen gentle human handling of their mothers—they were more likely to trust humans than those that hadn’t, she says.

“It seems that the best way to establish confidence with a new foal is through good contact with its mother,” Henry says. “Clearly, to create a positive horse-human relationship, it’s not a good idea to intervene in the natural progression of postnatal events, nor in the early mare/foal relationship.”

The Environment

What kind of home and life are we offering our foals? If you’ve changed your stable or management style, even a little, from one season to another, foals’ demeanors from one season to the next will reflect it with differences.

“A foal growing up in a very stressful environment can become fearful, even if his genes are lined up to make him not fearful,” Lansade says. “And the opposite is true, as well.”

After all, genetic personality traits are “like a metal bar,” she adds. “They’re pretty solid, but you can always bend them one way or the other through experience and environment.”

Lansade’s team recently conducted a study on older foals kept in “enriched” and “standard” environments. In the standard (control) environment, 10-month-old horses lived in individual stalls, consumed hay and/or grain three times a day, and went out to individual paddocks three times a week. In the enriched environment, the foals spent most of their time in pasture groups. They were given a variety of foods—different hays and grains as well as carrots and apples—and were exposed daily to different kinds of “stimulating” objects, odors, and music. After 12 weeks, the “enriched environment” foals were clearly less emotional and less easily stressed, Lansade says. The control foals, however, became





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“hypersensitive.” Incidentally, the enriched group also learned tasks faster and were easier to handle than controls, she adds.

The Little Incidents of Life

No matter what we do or how much care we put into honing every detail so our foals have the best possible personality or follow in the footsteps of that big-sister super filly from last year, there will always be factors out of our control. It’s those “little incidents of life,” says Lansade, that can really shape a foal’s experiences and, hence, the horse he becomes.

A paddock accident, a traumatizing weather event, a passing interaction with a threatening visitor (horse or human), an illness, or even particularly positive events such as a late-spring romp in the snow or a neighbor who brings treats—all these unplanned life experiences help shape a foal’s demeanor.

“Some things just happen, and that’s just part of life,” Lansade says. “Foals are going to react to the unique

experiences of their own lives, and that’s going to contribute to who they become.”

Take-Home Message

Horses are individuals, not robots, and like children, they will all develop their own unique personalities. We can always strive to optimize both “nature and nurture” with our breeding and management efforts, but there are still many factors that shape a foal’s demeanor that are out of our hands. By enriching their environment and social experiences, though, and allowing them opportunities to learn from positive and even slightly negative experiences, we set them up to mature to be good citizens, no matter their genetics.

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