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# The Transformation of the Dutch Farm Horse into a Riding Horse: Livestock Breeding, Science, and “Modernization,” 1960s–1980s

BERT THEUNISSEN

*This article analyzes the postwar transformation of the Dutch Warmblood farm horse into a riding horse. It gives special attention to the farmers’ practical breeding methods and to the role that scientists and government policymakers played in the transformation process. Until the 1970s, Warmblood breeding methods were a continuation of pre-Mendelian methods that focused on qualitative assessment of a horse’s conformation, that is, its exterior characteristics. In 1980, the Dutch government undertook an effort to modernize Warmblood breeding by turning it into a collectively organized, scientific enterprise. These plans were largely subverted by the fierce opposition of breeders. Nevertheless, quantitative scientific methods, particularly quantitative genetics, started to make inroads into Warmblood breeding at the time. However, the breeders’ decision to switch to quantitative methods was a reaction to other pressures, economic and otherwise, rather than a response to the government’s call for science-based modernization. Moreover, qualitative assessment remained as important in the selection of breeding stock as before.*

**I**N THE 1950s, TRACTORS BEGAN TO replace horses in Dutch agriculture on a significant scale. At first, horse-breeding societies did not expect the horse to disappear completely from the farm and the field. Most farms in the Netherlands were small, and tractors were considered useful and profitable only on larger farms. Moreover, it was believed that horses would continue to be more efficient for the lighter chores on the farm.<sup>1</sup> By the mid-1960s, however, when the scaling up of farms came to be seen as a precondition for their survival, *In de Strengen*, the leading Dutch horse-breeding journal, began to acknowledge that the tractor would not just supplement horsepower in agriculture but replace it. This implied that the Dutch draft horses, mostly Warmbloods

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of the Gelderlander and the Groninger type, were bound to disappear, unless they were given a new purpose. Horse riding was becoming more and more popular at the time, and it was obvious to fervent Warmblood breeders what needed to be done to rescue the type: they set themselves the task of transforming their working horses into saddle horses.

By the mid-1980s this mission had been completed, and quite successfully so. The Warmblood riding horse and the Dutch Warmblood studbook society were at the beginning of their rise to international prominence in equestrian sports. Today the society is one of the leading sport horse-breeding organizations worldwide. Dutch show jumping and dressage horses in particular play a prominent role in top-level equestrian events.<sup>2</sup>

This article analyzes how the Dutch working horse was transformed into a riding horse. The history of animal breeding in agriculture has received increasing attention in recent years.<sup>3</sup> At the intersection of science and practice, livestock breeding provides many opportunities for studying the circulation of knowledge and practices between agricultural policymakers, scientists, and farmers. The history of breeding illustrates the interconnectedness and interdependence of scientific, technical, and economic considerations on the one hand, and the norms, conventions, and practices that characterize breeding cultures on the other. This article gives special attention to the farmers' practical breeding methods and to the role that scientists and government policymakers played in the transformation process.

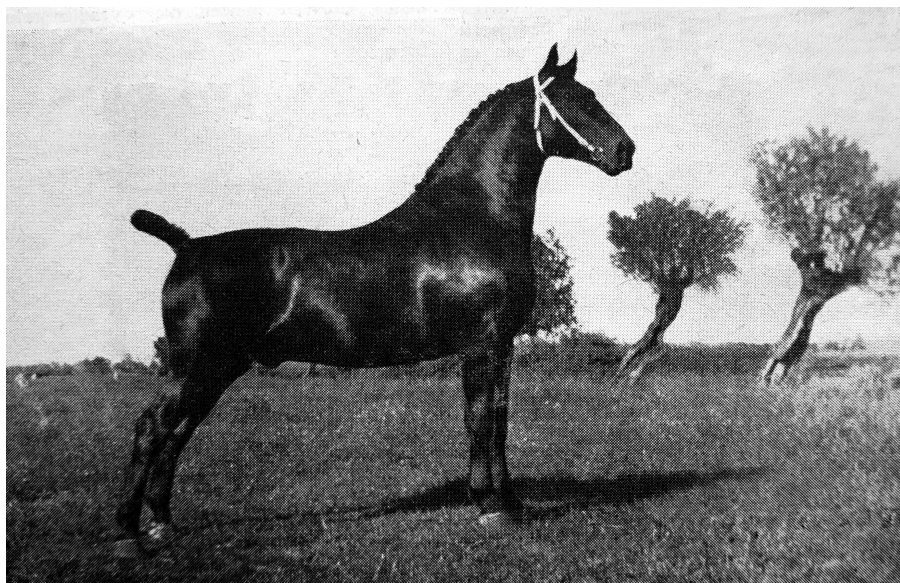
Compared to other European countries, where the transformation of the farm horse started several decades earlier, the process in the Netherlands took place within a short time span, between 1960 and 1985. Unlike Great Britain, Germany, and France, the Netherlands had no noteworthy tradition in equestrian sports before the 1960s. Horse racing (with Thoroughbreds or trotters), and show jumping and dressage (with Warmbloods) were marginal sports. Except among young farmers, horse riding as a leisure activity was not widespread either.<sup>4</sup> Racing would continue to be an insignificant sport, but leisure riding and show jumping became increasingly popular from the 1960s onward, to be followed by dressage in the 1980s. Warmblood breeders made a concerted effort to produce a good Dutch saddle horse in these decades, and their discussions on how to go about this have been documented in detail in *In de Strengen* (In the Reins), the Warmblood breeding society's official journal, which was published and mailed to all members every two weeks. Besides reports on meetings and shows, *In de Strengen* featured numerous articles on breeding issues by board members, studbook inspectors, scientific

breeding experts, and breeders. Naturally, debates on the best way to create a riding horse took center stage in the journal in this period. As will be shown, the methods employed by the breeders were a continuation of methods that had been well-known since the late eighteenth century, and thus had been in place well before the advent of Mendelian genetics at the turn of the twentieth century. Still, scientific views on breeding had a significant influence on the methods of the Warmblood breeders.

Another interesting aspect of the Dutch case is that there was minimal government involvement in horse breeding until the late 1970s, in contrast to Germany, where several of the *Länder* (States) had their own state studs, and France, where the government controlled the national *Haras* (stud farm) system. Before World War II, the Netherlands maintained a policy of neutrality and thus had a small army and no need for governmentally controlled studs. Horse breeding, including stallion selection, had been entirely in the hands of private breeding societies since the early twentieth century.<sup>5</sup> However, this situation seemed on the brink of change at the end of the 1970s, when the government attempted what, in the perception of the Warmblood society, amounted to a hostile takeover of the horse-breeding business. The government's initiative formed part of what is customarily called the postwar "modernization project" in Dutch agriculture, and its stated intent was to modernize horse breeding by turning it into a collectively organized, science-based, and thus more profitable enterprise. The way the ensuing controversy between the Warmblood society and the government played out illustrates in detail how the interactions between policymakers, scientists, and the breeders influenced the society's breeding aims and methods.

As it turned out, the government's plan for reforming the organization of horse breeding was largely subverted by the breeders' fierce opposition. Nevertheless, scientific methods started to make inroads into Warmblood breeding at the time, in that the instruments provided by quantitative genetics were adopted by the society to rationalize its methods of selective breeding. Thus, it might seem as if the breeders began to fall into step with the government's campaign for scientific modernization. Yet the logic of neither modernization nor of the scientific method fully explains how and why the breeders were induced to embrace the scientific approach. For this, as will be shown, the breeders' reactions to economic and political pressures and the particulars of Warmblood breeding culture have to be taken into account.

Confronted with the challenge of turning their farm horses into riding horses, the Dutch Warmblood breeding societies—there were separate soci-



**Figure 1:** The Gelderlander: farm horse, carriage horse, and riding horse. From *In de Strengen* 16 (May 15, 1954): 4.

eties for the Groninger and the Gelderlander type until 1970—took courage from the fact that the versatility of Warmbloods had ensured their enduring popularity over the centuries. Having originated in central Europe as a middleweight horse type, distinct varieties of the Warmblood were created from the eighteenth century onward, especially in Germany. The Dutch Gelderlander and Groninger took shape in the second half of the nineteenth century. They were used as a multipurpose farm horse and a carriage horse, while the lighter ones found their way to the military as saddle horses. From the 1920s onward, when the influence of the automobile began to be felt in the Netherlands, the Warmblood lost ground as a carriage horse. At the same time, it became more popular as a riding horse among young Dutch farmers who organized themselves into rural riders' associations.<sup>6</sup>

The Groninger type was used on the heavier soils in the north of the Netherlands and had a rather stocky build. The Gelderlander type was lighter and was therefore preferred by the rural riders' associations (Figure 1). The difference between the two types was not sharp, though. Like all Warmbloods, the Gelderlander and the Groninger were not distinct breeds but were performance types that were not bred pure. Breeders of Gelderlanders, for instance, often used Groninger stallions to prevent their type from becoming too light and thus unfit for farm work. And the breeders of both types used various

German and French Warmblood sires whenever they felt it would benefit their stock.<sup>7</sup>

Evidently, breed purity did not matter to the breeders of the Dutch Warmblood. Their selection criteria were performance, conformation (exterior characteristics), gaits, and a compliant character. For a mare or stallion to be admitted to the studbook—the Gelderlander and the Groninger societies administered their own studbook registers—they had to be judged according to these criteria by the studbook inspectors. As the Warmbloods were working horses, the emphasis on character and performance was logical. Until the 1930s, these traits were simply tested in daily practice—farmers had no use for horses that did not perform. From the 1940s onward, however, pulling and endurance tests were gradually introduced as part of the procedure for admittance to the studbook. Especially for breeding stock, a well-formed body and sound gaits were also deemed essential by the inspectors. Some breeders professed that conformation was even more important than performance, as a sound body was a precondition for working ability; it was a topic that generated much debate throughout the twentieth century.<sup>8</sup> Finally, seemingly irrelevant characteristics such as beauty and charisma were significant too, as horses were more than just a source of power for many farmers. The horse that worked the fields also transported its owners to church or to visit friends and family, and therefore it had to be both strong and good looking, and it should move gracefully in harness. Many farmers bred their horses as an extra source of income, and horse shows and prize competitions were organized to advertise the qualities of both mares and stallions. For showing purposes, an attractive conformation and elegant gaits were all-important.<sup>9</sup>

Whereas the number of working horses in the Netherlands had reached its postwar height with 268,000 individuals in 1947, ten years later their number had dropped to 163,000, making it clear to both the Groninger and the Gelderlander breeders that a change of course was necessary.<sup>10</sup> Initially the breeding societies believed that a number of minor modifications of its characteristics would suffice to make the Warmblood more suitable for riding.<sup>11</sup> The rural riders' associations agreed, as they were interested in riding horses that remained suitable for farm work.<sup>12</sup> At the same time, it was clear that the Gelderlander and, especially, the heavier Groninger, were anything but comfortable riding horses. They had a high stepping trot—with neck upright and head held high—which made for graceful movement in harness but not for pleasurable riding (Figure 2). Their galloping qualities also needed improvement. Furthermore, being built for pulling in harness, they had a rather square



**Figure 2:** The Gelderlander as a carriage horse; note the high knee action. From *In de Strengen* 47 (Feb. 21, 1980).

frame and lacked the well-developed withers and long, slanted shoulder of the saddle horse—characteristics that enable comfortable riding. So the question was how to introduce such riding horse qualities into the Dutch Warmblood.

To begin with, there was a tension between enhancing the Warmblood's riding characteristics and its suitability for carriage driving, as breeders were quick to point out. As indicated, the carriage horse was a trotter with high knee action. Riding horses, on the other hand, needed smooth gaits with little knee action. Acknowledging the incompatibility of these requirements, the

Gelderlander breed society decided that the harness horse (*tuigpaard*) and the riding horse should be bred as two distinct types of Warmbloods.<sup>13</sup> In what follows, the focus will be on the creation of the most important and popular type, the riding horse.

In theory, several options were available for turning the Warmblood into a riding horse. The new goal might be attained, for instance, by sustained selection within the Warmblood population. According to the Warmblood breeding experts, however, this approach was not feasible since it would take much too long in a slow-breeding animal like the horse.<sup>14</sup> A more realistic option was “breeding up,” a method well known among livestock breeders: breed A can be turned into breed B by using sires from B to cover the females of A for a number of generations.

Breeders agreed, then, that turning the Gelderlander and the Groninger into riding horses would require some form of breeding up with riding horse sires. Since there were successful examples to follow, they also agreed on what the first step should be. The quickest result would come by using a “hot-blooded” riding horse sire—either an English Thoroughbred or an Arabian—to cover the Gelderlander and Groninger mares. In the past, Dutch breeders had produced mounts for the military in this way.<sup>15</sup> And breeders in some German states, in France, and other European countries had not only crossed Warmblood mares with Thoroughbred and Arabian sires to produce horses for the military, but also for sports, since at least the nineteenth century. The Dutch breeding societies decided to follow suit.<sup>16</sup>

Given its racehorse conformation, stamina, superior galloping qualities, and eagerness to perform, the breeding experts felt that the Thoroughbred in particular would be an appropriate breed to infuse riding horse characteristics into the Dutch Warmblood. In 1962, studbook inspectors approved the use of Thoroughbreds as sires by breeders of Gelderland and Groningers. Their crossed offspring would be included in the studbook, albeit in a separate sport register.<sup>17</sup> Many Dutch breeders followed this advice, but not all of them. Especially in the early years, when there was still hope that the Warmblood would continue to be needed on the farm, many breeders, especially of the Groninger type, feared that breeding with Thoroughbreds might result in too much of a good thing. Thoroughbreds were called hot-blooded for a reason, and they might destroy, in a single generation, the equable temperament that was typical of the Dutch Warmblood. Moreover, Thoroughbreds were specialized racers, smaller and lighter than the Dutch Warmblood. Many were concerned that their offspring would not have enough mass and height to



serve as both comfortable riding horses and capable farm horses.<sup>18</sup>

Breeders who entertained such worries preferred to breed their mares with riding horse sires that were themselves crosses of Warmbloods and Thoroughbreds, and thus less hot-blooded. Progress would be slower this way, depending on the percentage of hot blood—simply called “blood” by the breeders—that a stallion carried, but it would also be safer. As the transformation from draft to riding horse had started earlier in Germany and France, crossed sires from German and French studs with varying percentages of Thoroughbred blood were used for this purpose. For instance, the German Holstein stallion Amor, and the Anglo-Norman stallion l’Invasion, whose pedigrees showed more distant Thoroughbred influences, would have a considerable influence in Dutch Warmblood breeding.<sup>19</sup> The offspring of such sires—provided they had been approved by the inspectors first—were also entered into the studbook. Nearly half of the breeders would follow this more cautious approach.<sup>20</sup>

The first generation of crossed horses initially raised eyebrows at shows, as they lacked the square body shape the breeders were used to.<sup>21</sup> Yet many of them proved to be of surprisingly good quality. They were judged to be excellent riding horses, and some of them developed into outstanding sport horses, particularly in show jumping, which was becoming popular in the 1970s. Their qualities were said to reside particularly in their docility and robust conformation.<sup>22</sup> Many of the crossed animals combined the conformation and temperament of their Warmblood mother with the smooth gaits, the stamina, and the willingness to perform of their Thoroughbred or crossed father. By the early 1970s the best of them were highly sought after by jumping riders in the Netherlands and abroad.<sup>23</sup>

Despite these quick successes, the mission of turning the draft horse into a riding horse was anything but complete. The big question was what to do next. The results of breeding with crossbreds, or “halfbloods,” were unpredictable, a phenomenon that had been known since breeders of livestock animals had begun systematically to improve their animals in the early nineteenth century. As Mendelian theory explains, while dominance relations may indeed make first-generation offspring look reasonably uniform, second-generation animals bred from first-generation parents will show the variability present in the original parental stock in all possible combinations, and thus uniformity is lost.<sup>24</sup> So what were breeders to do once they had performed the first-generation cross?

Initially there was broad consensus among the breeders that the original population of Warmbloods should be carefully maintained as a basis from

which to breed, if only because until the early 1960s there was still a need for good farm horses. Moreover, they argued, crossed animals and their descendants should remain capable of farm work too. For this purpose, first-generation crosses might be bred back to the original Warmblood type, resulting in animals that were 75 percent Warmblood (if a Thoroughbred had been used to produce the first generation). Breeders felt that introducing more blood into the second generation would not only make the animals unsuitable for farm work; they would also become too unruly for the average rider. Finally, there was the option of breeding with half-bloods, which was clearly the most difficult one, as the results from such combinations were hard to predict. As breeder Piet Meinardi expressed it: "It is really hard to say how we should proceed. Halfblood with halfblood, is that it? I don't know. It is very difficult. . . . Our breeding stock has become very diverse. There are many uncertainties."<sup>25</sup>

To keep variability in the second generation within bounds, breeding experts considered it advisable not to have a first-generation crossed mare covered by a first-generation crossed stallion, but rather by a sire in which riding horse qualities had been consolidated by judicious crossing for several generations. Initially such stallions were of course scarce in the Netherlands, but German riding horses such as Holsteins or Hannoverians provided an alternative. If a crossed mare was still too much of the draft horse type, a sire with more blood should be used. On the other hand, a higher percentage of Warmblood blood should be introduced to even out too much fieriness.<sup>26</sup> Inbreeding was another method to reduce variability and preserve desirable characteristics. This method was not without risks: inbreeding had long been known to increase the occurrence of weak or deformed offspring, which was probably the reason it was rarely mentioned in *In de Strengen*. Yet inbreeding was routinely applied by Warmblood breeders, as appears from analyses of pedigrees.<sup>27</sup>

Clearly, decisions on which characteristics the animals used to produce the second and consecutive generations should possess, had to be made on a strictly individual basis and should depend on the type of horse that was required. According to studbook inspector A. J. Vermond, breeders had to decide for themselves which sire would be best to combine with a particular mare.<sup>28</sup> The Utrecht zootechnologist and future society president, G. J. W. van der Mey, acknowledged that, rather than Mendelian crossing schemes, the breeder's experience in finding the right mix was essential.<sup>29</sup>

By the end of the 1960s it could no longer be denied that there was no

future for the Warmblood as a farm horse. "The battle is over," breeder F. A. Eysink wrote in resignation, "the car, the van and the tractor have won."<sup>30</sup> The Warmblood could only survive as a riding horse, the breeding societies acknowledged. As a consequence, prospects for the original Groninger Warmblood were dim. Its heavy build made it less suitable for riding than the Gelderlander, and there was little reason for maintaining it as a distinct type. The Groninger would indeed be amalgamated with the Gelderlander and its crosses, and the breeding societies of Gelderlander and Groninger were finally merged into a single association, the Warmbloed Paardenstamboek Nederland (WPN), in 1970.<sup>31</sup>

The original Gelderlander also faced difficulties. There was a prolonged and animated debate within the WPN as to whether it would continue to be needed for breeding purposes or not.<sup>32</sup> A group of breeders clung to the type, arguing that the Gelderlander was foundational to the successes of the Dutch Warmblood as a riding horse. The first-generation crosses were of proven quality, and the original type should therefore be maintained. The WPN board acknowledged this claim to the extent that it allowed the fanciers to establish their own sub-society within the WPN for what was variously called the "multipurpose" or the "basic" Gelderlander horse.<sup>33</sup>

In the 1970s, with the days of the farm horse being over, WPN inspectors concurred that the society's new goal should be to create a distinct Dutch riding horse that retained some of the characteristics of the original Warmblood, such as its size and mass, and its pleasant disposition. Once the Dutch type had been consolidated, foreign input would become unnecessary and the sport register might be closed.<sup>34</sup> The goal, however, was not to establish a uniform type or even a breed. For one thing, there was no standard of what a riding horse should ideally look like, all the less since differently built horses were used for different purposes, such as show jumping, dressage, or eventing. Moreover, it was not at all clear what a horse's ideal conformation for each of these different purposes might be—even some horses with obvious defects performed very well in sports.<sup>35</sup> A further complicating factor was the influence of training and of the rider, which could make or break a horse.<sup>36</sup> Still, the WPN continued to set great store by conformation as a basis for judging mares and stallions, as it had always done. The intention was to examine the animals for correctness of build and movement, and to exclude individuals with diseases or hereditary defects, rather than to compare them to a narrowly defined breed standard.

Even the aim of breeding exclusively with Dutch-bred horses had to be

reconsidered before long. In the late 1970s, breeders had begun to use fewer Thoroughbreds as sires: while the latter had initially accounted for about half the matings, percentages dropped to about 15 percent in the early 1980s.<sup>37</sup> Yet when confronted with the results of this trend, WPN inspectors rather disappointedly concluded that the Thoroughbred continued to be needed to enhance stamina and galloping power, possibly even in the long run.<sup>38</sup>

Preferences in terms of blood percentage were also influenced by outside pressures. In the 1980s, for instance, animal welfare considerations brought about a change in show jumping, beginning with the Olympic equestrian events in Los Angeles in 1984. While it had been customary until then to build courses with ever higher and broader obstacles that tested the horses to the utmost of their physical capabilities, the new approach was to design courses with lower and less dangerous fences that rather required swiftness and well-planned strides and turns. Agility and speed thus replaced extreme jumping power, and horses with more blood were better suited for this purpose.<sup>39</sup> This again shows that the WPN could not set a strict standard for the Dutch riding horse, nor did it wish to do so. Some inspectors preferred to talk about a European riding horse, which was certainly more in line with the multinational descent of most of the WPN-bred animals.<sup>40</sup>

A final change in the WPN's breeding policy came in the early 1980s, and its implementation was anything but smooth. This revision exposed a profound conflict between the breeding society and the government, and it set the stage for the lasting role of science in the WPN's breeding practices. In the mid-1970s, the Ministry of Agriculture and Fisheries commissioned a report on Dutch equine husbandry.<sup>41</sup> Unlike most other sectors of animal husbandry, particularly the cattle, pig, and poultry industries, the horse business had remained relatively free from government interference until then.<sup>42</sup> The report sketched a rueful image of the sector. While it had grown considerably in the preceding decade, many of those engaged in it—such as owners of riding schools, riding instructors, horse trainers, and breeders—hardly succeeded in earning a decent income. The breeders were mostly hobbyists whose objectives did not even include making a profit. The vast majority were farmers, and the report emphasized that they in particular should aim to turn their breeding activities into a profitable sideline. Toward this end, the report recommended making breeding practices more scientific.

For Warmblood breeders, the situation sketched in the report was aggravated by the economic recession that held the Netherlands in its grip in the second half of the 1970s. Horse sales stagnated and after 1974 the number

of newborn foals dropped steadily. By 1978 the number of inseminations had fallen by 30 percent and when the market finally stabilized in the mid-1980s, inseminations were down by 50 percent.<sup>43</sup> As most mare owners were hobbyists, they were not threatened in their livelihood by the economic downturn. It was more serious for the stallion owners: even though very few of them depended on their horses for their living, most sought to earn extra income through providing stud services.<sup>44</sup>

In reaction to the ministerial report, the WPN announced in early 1978 that it would partner in a study with the ministry and other equestrian organizations, to gauge the need for and viability of a national horse-breeding center that, among other things, would promote national and international sales of Warmblood horses.<sup>45</sup> Soon after, however, the Minister of Agriculture, A. P. J. M. M. van der Stee, a farmer's son and an avid rider himself, and M. P. M. Vos, also a farmer's son and the ministry's deputy director general, decided to take matters into their own hands.<sup>46</sup> Vos in particular would put his stamp on the ensuing course of events. In a previous job, as an animal scientist at Wageningen Agricultural University, he had played a major role in the modernization of dairy-cattle breeding in the Netherlands. Together with R. D. Politiek, professor of animal breeding at Wageningen, Vos had introduced index breeding in Dutch dairy farming in the early 1970s. Until then, farmers had mainly based their choice of breeding bulls on conformation. Amid the well-known European Economic Community crisis in dairying that resulted in milk lakes, butter mountains, and sharply dropping farmers' incomes, Politiek and Vos had, after a prolonged debate, convinced the farmers that their breeding method required rationalization, implying that bull choice should be based on proven hereditary capacity for milk production rather than on conformation. This capacity could be measured on the basis of progeny testing, that is on the basis of the milk production data of the bull's female progeny. These data could then be converted into an index expressing his breeding value for milk production. On the basis of their index, bulls could be ranked according to merit.<sup>47</sup>

Horse breeding should take a similar course, Vos argued in two articles in *In de Strengen* and at several WPN meetings. In the poultry industry, he expounded, commercial companies had taken over the business of breeding completely by following a strictly scientific approach, and the same would have happened in pig breeding, had the pig-breeding societies not changed course in time by also adopting scientific breeding methods. It was not too late for the horse-breeding societies to awaken from their slumber and to

give up their manifest aversion to measuring and calculating their animals' performance. The time-honored sire selection method based on quality of conformation had to be replaced by systematic progeny testing and selection for performance.

The WPN should take the dairy cattle breeders as an example, Vos continued. They had managed to keep control over bull breeding thanks to their high level of organization in cooperative breeding associations. Horse breeders had never been organized into cooperatives, but now was the time to catch up. Progeny testing was a costly procedure, and only by establishing cooperatives could small breeders muster the necessary means for its successful implementation. Another crucial element in scientific breeding, as again demonstrated by the cattle breeders, was the use of artificial insemination (AI), which enabled the use of the best sires on a worldwide scale. Especially in this respect, horse breeding had to make up arrears, as AI had only just begun to play a role in it.<sup>48</sup> Underlining the necessity, the inevitability even, of the proposed reforms, Vos professed: "Horse breeding will not be able to avoid what has happened in chicken, pig and cattle breeding. This development cannot be reversed, and neither can the use of AI."<sup>49</sup>

The WPN board, now led by the zootechnologist G. J. W. van der Mey, responded to Vos's call to action by initiating talks with the ministry. The tone was positive at first, and the board applauded the government's intent to stimulate the sector. They again discussed the idea of a national horse-breeding center, in which the WPN and other equestrian organizations would participate. But the atmosphere soured when it appeared that the ministry had also begun consultations with F. A. Melchior, a Maastricht millionaire who had earned his fortune as a contractor and developer, and who owned a large stud farm named Zangersheide.<sup>50</sup>

In Vos and van der Stee's opinion, Melchior's breeding methods were exemplary. At Zangersheide he closely followed the dairy cattle breeding system by subjecting his stallions to rigorous progeny testing. When a promising young stallion was sexually mature, at the age of two or three, he was to inseminate a limited number of about twenty mares. Then he was put on hold, so to speak: he was not to cover any more mares until data became available about the quality of his offspring. Meanwhile, he was used as a sport horse, which also provided information about his qualities as a sire. When he had reached the age of eight or nine, the merits of his offspring became decisive in determining his future as a stud horse.<sup>51</sup>

Vos and van der Stee argued that such a system would overhaul Dutch

horse breeding into a science and give it a rational foundation as a commercial enterprise. In consultation with Melchior, they had developed plans for an experiment station and a stud farm in which the government, Melchior, and, hopefully, the WPN breeders, would participate to improve the Dutch riding horse and its marketability. Melchior was to bring a couple of excellent sires and some four hundred mares into the joint enterprise. (In comparison, the average Dutch breeder at the time owned fewer than two mares.<sup>52</sup>) The WPN breeders were invited to become partners in the breeding program. Furthermore, Vos and van der Stee envisaged facilities for rearing, training, and selling horses, and for scientific research on artificial insemination, nutrition, grassland management, and more.<sup>53</sup>

President van der Mey and the WPN board reacted with increasing aversion to the government's initiative. For them, despite protestations to the contrary by minister van der Stee, the partnership with Melchior implied that the government would become a competitor in the field of Warmblood breeding.<sup>54</sup> The WPN breeders, particularly the stallion owners—about eighty in number—would be pushed out of business if the plans were put in effect. Horse breeding had always been a small-scale, private activity, in which profit had been subordinate to the pleasure some ten thousand mare owners derived from their hobby. The ministerial plans, according to van der Mey, were too centralistic and went against the grain of what really mattered in the Warmblood breeding world. The board was still willing to cooperate, but stated firmly that the WPN would end negotiations if the government was to become a competitor for the stallion owners.<sup>55</sup>

Van der Stee, Vos, and Melchior pressed on, however. Another impetus for their plans derived from van der Stee's vision of a wider initiative to stimulate employment in an economically weak region, the southern part of the province of Limburg. Besides the breeding station, van der Stee also planned the construction of a hippodrome in the province, which might improve regional employment and bring in revenues to finance the projected equine breeding and research station.<sup>56</sup>

Misgivings about these plans were not only voiced by WPN breeders. The president of the federation of Dutch equestrian sports organizations (Nederlandse Hippische Sportbond, NHS) also criticized them for being centralistic and for focusing on commercial aspects of horse breeding, neglecting that horse riding was, first and foremost, a recreational sport. The National Agricultural Board (*Landbouwschap*) warned that the establishment of a state-stud might force out many small studs. This would jeopardize the availability of the

wide variety of bloodlines that was needed for breeding riding horses.<sup>57</sup> After the ministerial intentions had been detailed in a policy document in early 1980, Members of Parliament also began to question them. They heckled the minister about what they saw as an undesirable intrusion into the private business of horse breeding. Furthermore, they felt that the plan's vagueness precluded an assessment of its financial soundness.<sup>58</sup>

Meanwhile the WPN consulted its members in the regional branches of the society about the ministerial note.<sup>59</sup> Newspapers reported heated meetings of stallion owners, with one headline in a national newspaper proclaiming that the horse breeders were at war with the ministry.<sup>60</sup> Stallion owners also voiced their concerns in *In de Strengen*.<sup>61</sup> The unfair competition implicated by the partnership with Melchior and the threat to their independence formed the core of their grievances. Their agitation only grew when it was suggested that Melchior might establish his own stud book if the WPN refused to register the horses to be bred at the Limburg experiment station.<sup>62</sup> It did not help that Melchior was unwilling to subject his stallions to the regular WPN sire approval procedure; in his view rigorous exterior evaluation was superfluous.<sup>63</sup> The dispute reached its climax on June 19, 1980, when the WPN organized a protest rally at the Binnenhof, the Dutch House of Parliament, where President van der Mey read a petition that emphasized that horse breeding should remain the domain of small-scale private enterprises (Figure 3).<sup>64</sup>

As a result of the opposition, a new round of parliamentary consultations about the Limburg project was scheduled for early September. It was forestalled, however, in early July 1980 when Melchior announced his withdrawal from the partnership, saying that he was sick and tired of being kept in suspense.<sup>65</sup> This necessitated a major revision of the ministry's plans. Van der Stee had by then been succeeded by G. J. M. Braks as Minister of Agriculture, and the latter took a different view of the matter.<sup>66</sup> Acknowledging that horse breeding should remain a small-scale activity, he presented a new version of his predecessor's plans in which the government would restrict its involvement to research, education, and information—the regular instruments to support agriculture. The goal would remain to help the horse-breeding sector to escape from its marginal position, yet there would be no state stud. Instead, Braks opted for an experiment station for equine husbandry, which would conduct research on, for instance, artificial insemination, equine diseases, stable design, and nutrition. He also planned a rearing and training center as well as facilities to stimulate the export of sport horses. Funding would have to be partly provided by the stakeholders in the horse industry, as was customary





**Figure 3:** WPN members demanding more scope for their hobby at the Dutch House of Parliament, June 19, 1980. From *In de Strengen* 47 (June 27, 1980): extra pages, II.

in other sectors.<sup>67</sup>

For the WPN, this resolved the main issue that had provoked their opposition to the government plan, and after some time, peace was restored in the horse-breeding world. In the end, van der Stee's original project was to be realized only to a very limited extent, because lack of funds forced Minister Braks to scale down even his reduced plan. The experiment station was indeed established in Merkelbeek, in the province of Limburg, and the projected research on AI—for which the government bought three stallions from Melchior—quickly gained momentum there.<sup>68</sup> Yet the proposed extension with training, information, and sales facilities was not realized; neither the breeders nor businesses had shown sufficient interest in participating.<sup>69</sup> On top of it all, the hippodrome, which opened in 1980, proved unprofitable and was ultimately closed down.<sup>70</sup> Thus the betting revenues expected to support the experiment station never materialized.

The only activity that generated some revenue was at the AI station, where researchers collected data by making the stallions purchased from Melchior available to WPN breeders. Even though his semen was twice as expensive as that of an average stud, mare owners happily made use of the insemina-

tion services offered by Ramiro Z, a Holstein sire of proven quality whose offspring showed their mettle in both show jumping and dressage. When the experiment station was scaled down in 1982, these services were suspended and Ramiro was transferred to a private stallion station elsewhere in the country, where he continued his services.<sup>71</sup>

While it may appear that the ministry's initiative to stimulate horse breeding had only a very limited effect, indirectly its impact was more significant. Between 1979 and 1981, the years of the Melchior affair, the WPN board announced a number of what were called "historic" adjustments to its breeding strategy and methods. Most of these had been under consideration for quite some time, but government pressure clearly sped up their implementation.

In the 1970s, the WPN had defined producing good saddle horses as its new breeding goal. In addition to the traditional inspection of stallions on the basis of their conformation, gaits, and character, their performance as riding horses was given increasing weight, while other characteristics, such as pulling capacity, lost their usefulness. After extensive deliberation, a new testing procedure was adopted in 1978, which included a hundred-day period of training and testing of three-year-old stallions. Core components of the evaluation were soundness of conformation and gaits, talent for jumping and dressage, willingness to work, and docility. Selection for conformation and movement was intense: less than 10 percent of the stallions offered for inspection were admitted to the hundred-day test after exterior examination. Stallions that passed the test were, after a final examination by the inspectors, entered into the studbook, yet only for a limited time. Sport performance data that became available over the years, of the sires themselves and of their offspring, were taken into account during periodical reassessments of their stud-worthiness.<sup>72</sup>

Sport data were not yet collected systematically in the Netherlands, in contrast to France and Germany. Therefore, such assessments remained rather haphazard. In 1978, however, at the time when Vos was presenting his views on scientific breeding to the WPN breeders, discussions in *In de Strengen* generally acknowledged the need for systematic recording of sport data.<sup>73</sup> In a debate over whether precedence should be given to either conformation or performance, P. B. van Binsbergen, the chairman of the stallion inspection committee, argued that while conformation and comportment were important, stallions should ultimately be judged on the basis of their performance.<sup>74</sup> In June 1979, the WPN acquired a computer to store and process performance data, and *In de Strengen* published the first sport-performance data of WPN breeding sires and their progeny in 1983.<sup>75</sup> A few years later the

Utrecht zootechnologist H. A. Huizinga converted the data into indexes reflecting the stallions' breeding value.<sup>76</sup>

The WPN formally announced that breeding for performance would henceforth be the society's formal breeding goal in early June 1980, just when the controversy with the ministry was nearing its climax. While this decision was a final piece in the WPN's recent reform of its stallion testing procedure, it was also an acknowledgement of Vos's critique that a focus on performance rather than conformation was needed to rescue horse breeding from its marginal economic position. In his yearly report, President van der Mey indeed underlined that stallion owners should set their sights on quality of performance to overcome the difficult period they were experiencing.<sup>77</sup> Quality paid, *In de Strengen* affirmed: even in times when overall sales were low, the truly good WPN horses remained in high demand on the international market.<sup>78</sup>

On top of this change in breeding policy, the WPN board also introduced an optional selection system, in which a stallion, after a restricted number of test matings, was not to be used for breeding until data about his progeny became available.<sup>79</sup> This second system was by and large a copy of Melchior's breeding method, the only difference being that the WPN retained exterior and character evaluation as key elements of the testing procedure. As it turned out, however, WPN breeders showed no interest in this option, and it never got off the ground. Raising a colt was expensive enough, two stallion owners explained in *In de Strengen*, and the waiting period would simply be unaffordable for small breeders.<sup>80</sup>

Another development that was already underway but that was clearly facilitated by the government's intervention, was the introduction of artificial insemination. While breeders had occasionally applied the technique in the Netherlands since the early twentieth century, its use remained marginal until the 1980s. AI in horses faced numerous complications. There was considerable variability in sperm quality and quantity between stallions; fresh semen was short-lived and therefore difficult to transport; preparing frozen semen was complicated; determining the right moment of insemination of a mare required much experience; and in the end, success percentages, especially with frozen semen, were much lower than in dairy cattle breeding, where AI had become standard procedure.<sup>81</sup>

Until the 1980s most stallion owners saw little reason for adopting the technique. They had the same reservations as their colleagues in Thoroughbred breeding, who continue to prohibit the use of AI today. Breeders often support this prohibition as a way to prevent the excessive use of a small num-

ber of top stallions. Yet obviously, economic considerations play a major role: the limited availability of a top sire's semen keeps prices of both the animal and its semen high.<sup>82</sup>

The WPN never considered such an absolute ban on AI, but their regulations were strict. For instance, a veterinarian had to perform the insemination, natural service was no longer permitted for AI stallions, and in 1979 the WPN board limited the permitted number of yearly inseminations per stallion to two hundred fifty, a number a fertile stallion could also realize by natural service.<sup>83</sup> In 1982, a calculation in *In de Strengen* suggested that, given the limitations and regulations, natural service was still more efficient, economically as well as practically, than artificial insemination.<sup>84</sup> Moreover, the Netherlands is a relatively small country, so bringing the mare and the stallion together rarely posed problems.

Again, the government's dealings with Melchior prepared the ground for a turnaround. The government made the Melchior-bred state-stallions available to WPN breeders only on the basis of AI. Inseminations with semen from Ramiro Z proved to have an especially high success rate, and as indicated, breeders eagerly seized the opportunity to make use of this excellent sire's services. Researchers at the Merkelbeek experiment station, in collaboration with veterinarians from Utrecht University, investigated how best to collect, dilute, freeze, and transport horse semen, and they learned how to obtain satisfying success rates. In 1984, when Ramiro Z was transferred to a private stallion station established by veterinarian W. van der Holst in Stroe, his diluted semen could be distributed throughout the country. WPN stallion owners then began to feel they might miss the boat. Veterinarian Hans Umland, a pioneer of AI in dairy cattle, and three stallion owners set up an AI station in Lexmond in the same year, an event described in *In de Strengen* as a "milestone in the history of horse breeding."<sup>85</sup>

While the number of stallion owners who embraced AI began to grow, mare owners were hesitant to follow suit. Apparently, their interest in Ramiro Z did not imply an interest in AI as such. On top of this, the success rates the AI researchers at Merkelbeek obtained with Ramiro Z semen proved difficult to match by the private stations. The station in Lexmond had to close its doors after two years. The situation changed suddenly in 1987, however, when the extremely contagious venereal disease contagious equine metritis was diagnosed for the first time in the Netherlands.<sup>86</sup> AI became the spearhead of the veterinary program set up to contain the spread of this disease. The WPN relaxed regulations for its use and costs decreased, resulting in a

swift adoption of AI by mare owners. In 1993, AI accounted for 80 percent of all inseminations in the Netherlands.<sup>87</sup>

The government's intervention had a catalyzing effect on one final development within the WPN: the society's reorientation from catering to the needs of the national market of leisure riders to those of the international market for sport horses. In the 1970s the society saw recreational riders as the principal target market; they accounted for about 80 percent of the horses sold at the time. Sport horses, accounting for about 5 percent, were difficult to select for as long as pedigree and performance data had not been linked; they were seen as a byproduct.<sup>88</sup> When the WPN redefined its breeding goal as breeding for performance, however, it redirected its focus to the production of sport horses, for which demand exceeded supply, nationally and internationally. Now recreational horses became the byproduct, even though they would continue to constitute the majority of the horses bred: talented sport horses are rare and only a very small percentage can make it to the top. By focusing on breeding for performance the WPN clearly hoped to get the best of both worlds: a better chance for the stallion owners to profit from the rising international market for sport horses, and better horses for the leisure riders too.<sup>89</sup>

This reorientation signaled the beginning of the WPN's rise to international prominence as a sport-horse-breeding society. It entailed increasing specialization, in that dressage horses and jumping horses became separate breeding lines, and an ever-closer cooperation with animal scientists, whose methods for quantitative assessment of performance and index calculation enabled the specialization. Exterior evaluation would ultimately come under the regime of quantitative assessment as well.<sup>90</sup>

The reorientation would in due course be accompanied by a fundamental change in the social background of the WPN's membership, as breeding would cease to be a predominantly agrarian activity. The international world of competitive horse breeding and sports is now dominated by people from outside of agriculture, among whom, not coincidentally, F. A. Melchior was a major player until his recent death in 2015. There is no indication that the WPN foresaw this development in the period discussed here, and it was certainly not intended by M. P. M. Vos and the Dutch government, whose principal objective had been to develop horse breeding into a profitable sideline for farmers.

In the early 1980s, when all this was still far away, the WPN board confidently declared in *In de Strengen* that its mission to transform the Dutch farm horse into a riding horse was complete. The result was not, nor had

been intended to be, a uniform new breed. Like the Gelderlander and the Groninger, the Dutch saddle horse was a performance type. There was still much variability among the mares: some of the classical Gelderlanders were still around, many were halfbloods, and an increasing number had varying percentages of Thoroughbred blood. Thus, a wide variety of bloodlines was also needed when it came to the sires, and they had to be chosen on an individual basis by the mare breeders. The Thoroughbred would continue to be indispensable to consolidate the riding horse characteristics of the population as a whole. Thus, if anything, flexibility was a defining characteristic of Dutch Warmblood breeding, and finding the right mix was the secret of breeding a good horse.<sup>91</sup> The breeding goal had switched to breeding for performance, yet the WPN held on to judging prospective breeding sires on the basis of some of the typical characteristics of the farm horse: soundness of conformation and movement, and tractability.

This episode suggests several conclusions about the role of science, particularly genetics, and the politics of modernization in the history of Dutch horse breeding. Historical analyses of plant breeding practices have shown that the role of Mendelian genetics was not as straightforward as previously assumed.<sup>92</sup> If more than a few hereditary factors were involved, the time and costs of performing Mendelian crosses quickly became prohibitive. And while the mechanisms of Mendelian genetics could explain the experimental outcomes of some breeding practices, Mendelism was far less capable of providing guidelines for successful breeding. In animal breeding, even more practical obstacles stood in the way of a Mendelian approach. Animals breed slowly and are more expensive than peas or corn. Moreover, most of the economically relevant characteristics of animals, such as milk, meat, or egg production, are of the genetically quantitative kind, involving many unknown genes. Consequently, Mendelian analysis of crossing experiments was impossible in the practice of animal breeding.

Warmblood breeding provides a textbook example. The characteristics the breeders were after, such as pulling power or jumping talent, were quantitative traits that could not be analyzed in terms of genes. Warmblood breeders only referred to Mendel when they discussed the difficulties of breeding from first-generation crosses. Livestock breeders in the nineteenth century had been well aware of this problem too, and Mendelian theory, while explaining it, did not offer a way to solve it. To obtain the desired type, breeders resorted to what they called mixing blood. A keen eye and trained judgment were crucial in making the right mating combinations. Breeding was a balancing act,

and Mendel's rules were of no help in making breeding decisions.

In many breeds of livestock, Mendelian genetics reinforced the focus on purity that had been the hallmark of successful breeding since the early nineteenth century.<sup>93</sup> Purity implied uniformity and predictability; the quality of the offspring produced by purebred breeding stock could be guaranteed, and Mendelism explained why this was so. In Warmblood breeding, however, there was no such focus on purity. The versatility of purpose that was gained by judicious crossing was deemed more important than uniformity.

Scientific livestock breeding, as defined by animal scientists, was based on quantitative genetics, which by and large boiled down to progeny testing: the tree is known by its fruits. This approach had been well known since the late eighteenth century; it was the very core of the successful breeding practices of pioneer Robert Bakewell.<sup>94</sup> The big difference in postwar animal science was predicated on measuring, counting, and calculating, especially when computers became available to store data and calculate indexes. To put it differently, scientists rationalized the breeding process. Quantitative genetics changed animal breeding dramatically, yet its application did not require any specific knowledge of hereditary mechanisms. When scientists entered the field of Warmblood breeding in the Netherlands, the transformation of the farm horse was by and large complete. In this case, too, scientists helped to rationalize the breeding process by means of progeny testing and index calculation. The use of AI as a reproduction technology can also be seen as a rationalization of the breeding process. In short, scientists did not change the principles of horse-breeding in any fundamental way; rather, they helped breeders to apply these principles more efficiently.

The WPN's response to the ministry's plan for the reorganization of horse breeding shows that the agency of the farmers was an important factor in the dynamics of the Dutch government's agricultural modernization project. Van der Stee and Vos's initiative illustrates how agricultural scientists and the Dutch ministry of agriculture worked together to bring this modernization about. Having come to the ministry from Wageningen University's animal husbandry department, Vos would return to his alma mater in 1990 as president of the executive board, and he thus exemplifies the strong personal ties that cemented what Harro Maat has called the "discourse coalition" between the university and the ministry.<sup>95</sup> For both van der Stee and Vos, there was an intrinsic logic to the idea of modernization through science. In their view, it was inevitable that scientific methods such as progeny testing and AI would be introduced in horse breeding. Vos in particular was convinced that what

had been accomplished in dairy cattle, pig, and poultry breeding, would and should also happen in horse breeding. As Abigail Woods has noted, some histories of twentieth-century agricultural development still seem to reproduce such teleological notions of the modernization process.<sup>96</sup>

Convincing the breeders of the inevitability of scientific modernization proved more difficult than Vos had expected, however. "Oh boy, did I underestimate the resistance that Melchior would evoke," he sighed, looking back on the period in a later interview.<sup>97</sup> The reasons for this resistance are not hard to understand. For one thing, breeders saw the establishment of a state-sponsored stud farm as unfair competition. Even more importantly, Vos's model for his reform plan was dairy cattle breeding, and here the bull breeders had been pushed out of business by farmers' cooperatives. This fate, however, did not befall the stallion owners, as they successfully averted the threat to their small-scale enterprises.

Van der Stee and Vos similarly misjudged the willingness of the mare owners to form cooperatives. There had never been cooperative horse-breeding associations. The main reason, obviously, was the absence of a common breeding goal among horse breeders. In dairy cattle breeding it made sense collectively to exploit a bull, since cattle were bred pure and there were clear-cut standards for a good bull. Warmbloods, on the contrary, were produced by mixing blood, and for the mare owners the availability of a wide variety of stallions took precedence over the advantages of collectivization. Furthermore, the dairy cattle farmers were put under severe pressure by the dairying crisis of the late 1960s. Their livelihood was at stake, and increasing milk production seemed essential to rescue their business. Collectively testing bulls for performance and index breeding, as propagated by animal scientists, offered them a way out of their predicament.<sup>98</sup> Mare owners experienced no such urgency, as they did not depend on their horses for their living. Their voice was hardly heard during the Melchior episode, and they seem to have resigned themselves just to sit out the adverse economic circumstances of the late 1970s.

Mare owners were similarly unimpressed by Vos's insistence on the necessity of AI. Until the mid-1980s they saw no need for it, as it offered no advantages over natural service. When they began to adopt AI in the late 1980s, it was not for breeding reasons, but to fight a highly contagious disease. There is a parallel with cattle breeding: dairy farmers embraced AI en masse in the 1940s, when venereal diseases spread by natural covering had become a major threat, but only in the 1970s would AI become important as a breeding technology in dairy cattle.<sup>99</sup>



Because of its timing at the peak of the Melchior affair the WPN's endorsement of breeding for performance can partly be seen as a genuflection to the ministry's urge for scientific breeding. The WPN thus purported to show that it was already practicing what the ministry preached and could do without its intervention. The WPN's change of breeding strategy was at the same time an acknowledgement of the economic pressure that the stallion owners were under: the market was at a low ebb, but good sport horses continued to be in high demand. Furthermore, it should be kept in mind that the WPN was already moving in this direction of its own accord, as the earlier efforts to link pedigree and sports performance data show. Finally, the WPN did not relax its selection for conformation and gaits, which left only about 10 percent of the stallions offered for admittance to the studbook to be tested for performance. So in its practical effects the change of breeding strategy was not as dramatic as it might seem at first blush. Similarly, the WPN's decision to allow its members to test stallions by means of the waiting system deployed by cattle breeders, was obviously prompted by the Melchior affair. However, one may wonder whether this was anything but a token gesture, as the board had earlier pointed out that it was too expensive for the average breeder. Breeders showed no enthusiasm for the system anyway.

In sum, the reactions of the WPN breeders to the government's campaign for scientific breeding was not dictated by the suggested logic or necessity of modernization through science. The breeders reacted to specific pressures, economic and otherwise, rather than the call to modernize their practices. Nor was the modernization project a scenario for the future that was imposed on them by scientists and policymakers, as rural sociologist Jan Douwe van der Ploeg has argued. This claim clearly underestimates the agency of the breeders in giving shape to the project.<sup>100</sup>

All this is not to deny, however, that science-based breeding technologies became an important factor in the WPN's reorientation from the early 1980s onward. Once the WPN was able to systematically link pedigree and sports data, breeding for performance could be rationalized by means of index calculation, for which quantitative genetics provided the tools. Indexes, in turn, enabled specialization: on the basis of their performance, show jumpers and dressage horses could be specifically selected for, which had been well-nigh impossible on the basis of conformation only. Similarly, the research on AI, which was conducted with government support when the breeders showed little interest in it, was ready for use when the breeders were driven to adopt it to fight contagious equine metritis. AI soon became the default reproduction

method and a breeding tool that enabled the worldwide use of the best sires.

There was no sign among the breeders of an abhorrence of calculating, as Vos had put it, or of a conservative aversion to scientific methods generally. Breeders welcomed new technologies if they fit into their breeding practices and the advantages were clear to them. Their opposition stemmed from the particular dynamics of the government's intrusion into their breeding culture, which did not lend itself to being restructured on the cattle-breeding model, and in which other considerations, besides making profit, played a role. Horse-breeding practices became scientific in the end, yet the tenets of agricultural modernization are of little help in understanding how this came about.

## NOTES

1. Between 1940 and 1951, for instance, the number of tractors in Dutch agriculture grew from four thousand to twenty thousand. See J. C. Gehrels, *Paard en trekker in het gemechaniseerde landbouwbedrijf* (Groningen: 1951); P. R. Priester, "Paarden en trekkers," in *Techniek in Nederland in de twintigste eeuw*, Vol. 3, *Landbouw, voeding*, eds. J. W. Schot et al. (Zutphen: Stichting Historie der Techniek, 2000), 73–81.

2. In recent years, the society ranked in the top two (dressage) and the top four (jumping) in the studbook rankings of the World Breeding Federation for Sport Horses; see <http://www.wbfsh.org/GB.aspx> (Accessed Mar. 23, 2017).

3. To give just a few examples: Roger J. Wood, and Vítězslav Orel, *Genetic Prehistory in Selective Breeding: A Prelude to Mendel* (Oxford: Oxford University Press, 2001); Margaret E. Derry, *Art and Science in Breeding: Creating Better Chickens* (Toronto: University of Toronto Press, 2012); Margaret E. Derry, *Masterminding Nature: The Breeding of Animals 1750–2010* (Toronto: University of Toronto Press, 2015).

4. For a history of Dutch horse racing, see D. Minkema, Koos Jager, and Douwe Frerichs, *Dravend door de tijd: Geschiedenis van de Nederlandse draverfokkerij* (Den Haag: 1996). For a history of the rural riders' associations, see Jacob Melissen, Yana van Tienen, and John Brandsen, *Kroon op het werk: 75 jaar KNF, 1926–2001* (Houten: Premium Press, 2001). There are two main reasons for the marginality of racing in the Netherlands. Traditionally, racing was "the sport of kings," that is of the nobility. In Dutch history, the nobility played a far less significant and visible role than in other European countries, and racing never gained wide popularity. Secondly, between the early twentieth century and the early 1940s the confessional political parties that dominated Dutch politics prohibited racing on Sundays, as well as betting and bookmaking, which resulted in a further decline of the sport. A later attempt to revitalize racing will be discussed below.

5. In 1918 the government transferred the authority to inspect stallions for stud-worthiness to the breeding societies; see J. H. W. Verzijl, *Wet van den 18 den Juni 1918, S. 419, houdende bepalingen betreffende de Staatszorg voor de paardenfokkerij* (Zwolle: 1918).

6. For histories of the Dutch Warmblood, see A. van Leeuwen, *Geschiedenis der paardenfokkerij in Nederland* (Maastricht: Leiter-Nypels, 1922); Wouter Slob, *Het Nederlandse paard: De geschiedenis van de Nederlandse warmbloedfokkerij tot 1950* (Doetinchem: Misset, 1995).

7. Slob, *Het Nederlandse paard*, 66–73, 92–93, 98–99.

8. For examples of the perpetual debate on the importance of conformation versus perfor-

mance, see Slob, *Het Nederlandse paard*, 85–87; A. Heuff, *De landelijke ruitersport* (Doetinchem: Misset, 1968) 49–50.

9. Slob, *Het Nederlandse paard*, 78–87.

10. B. J. B. Groeneveld, “Een analyse van de werkpaardenstapel,” *In de Strengen* (hereafter abbreviated as *IdS*) 20 (Dec. 1, 1958): 6–10. By 1968, the number had dropped to 66,400; see A. Heuff, “Aantallen paarden,” *IdS* 30 (Sept. 1, 1968): 13.

11. For discussions on the new breeding goal, see for instance G. A. R. Nieuhoff, “Ingezonden,” *IdS* 22 (May 1, 1960): 4–5; J. A. Crebas, “Overpeinzingen over het paard op onze landbouwbedrijven,” *IdS* 23 (Feb. 1, 1961): 4; B. Seldenrijk, “Quo vadis V.N.L.-fokkerij, waarheen gaat gij?,” *IdS* 23 (Oct. 1, 1961): 2–3.

12. Nieuhoff, “Ingezonden,” 4–5.

13. A. J. Vermond, “V.L.N. 1967. Ontwikkeling van de fokkerij en aanpassing van de fokleiding,” *IdS* 29 (June 15, 1967): 3. The *tuigpaard* type is unique to the Netherlands.

14. *Ibid.*

15. Slob, *Het Nederlandse paard*, 52–55.

16. For a history of early Thoroughbred breeding, see Nicholas Russell, *Like Engend'ring Like: Heredity and Animal Breeding in Early Modern England* (Cambridge: Cambridge University Press, 1986), 60–65, 85–86, 98, 218–22. The German Hannoverian, Holstein, and Trakehner, are examples of Warmbloods that have been crossed with Thoroughbreds and Arabians since at least the nineteenth century; see Bonnie N. Hendricks, *International Encyclopedia of Horse Breeds* (Norman: University of Oklahoma Press, 1995), 213–14, 224–27, 421–23.

17. “Agenda der Algemene Ledenvergadering, te houden op 30 januari 1962,” *IdS* 23 (Dec. 15, 1961): 2–3.

18. See, for instance, J. Roodenburg, “V.L.N. fokkerij met meer bloed,” *IdS* 23 (Nov. 1, 1961): 5; C. P. W., “Afdeling Zuiderzeeland,” *IdS* 24 (Feb. 15, 1962): 4–7.

19. W. Slob, “De fokkerij in Frankrijk,” *IdS* 43 (June 3, 1976): 1; H. Kingmans, “Amor: bouwmeester die zijn tijd vooruit was,” *IdS* 46 (Nov. 15, 1979): 15–21.

20. H. Kingmans, “Directe rol van Vollbloed nog zeer sterk in nieuwe jaargang,” *IdS* 44 (Jan. 13, 1977): 4–6. For an overview of the different breeding options, see Vermond, “V.L.N. 1967. Ontwikkeling van de fokkerij en aanpassing van de fokleiding,” 3.

21. See, for instance, W. Slob, “Utrecht 1962,” *IdS* 24 (Sept. 15, 1962): 2–8.

22. H. Kingmans, “Van Binsbergen (met bolhoed geboren),” *IdS* 41 (May 10, 1974): 10–11.

23. “Nederlandse halfbloedfokkerij bereikt de internationale rijpaardenmarkt,” *IdS* 30 (Oct. 1, 1968): 1; A. Heuff, “Utrechtse hengstenshow een manifestatie van internationale allure,” *IdS* 36 (Feb. 19, 1971): 2–7.

24. For a short explanation of Mendelian genetics, see <https://www.khanacademy.org/science/biology/classical-genetics/mendelian-genetics/a/the-law-of-segregation> (Accessed Oct. 27, 2017).

25. H. Kingmans, “De baas van Henri, de rappe draver. Pieter Abel Meinardi: veelzijdig fenomeen,” *IdS* 42 (Jan. 2, 1975): 17–21.

26. There was an extensive discussion on these matters in *In de Strengen* that continued for over a decade. See, for instance, G. M. van Charante-Terlingen, “Ingezonden,” *IdS* 25 (Jan. 1, 1963): 3–4; A. J. Vermond, “V.L.N. 1967. Ontwikkeling van de fokkerij en aanpassing van de fokleiding,” 3; P. van Schaik, “Beschouwing over de hedendaagse fokrichting en over toe te passen fokmethoden,” *IdS* 30 (Apr. 1, 1968): 1–2; P. van Schaik, “De vollbloed in de rijpaardfokkerij,” *IdS* (Apr. 2, 1971): 1–2; P. van Schaik, “Over het fokdoel,” *IdS* 41 (Mar. 29, 1974): 11–12.

27. A. M. H. Sanger, “Ervaringen in de vollbloedfokkerij en de relatie met de WPN-fokkerij,” *IdS* 49 (Jan. 14, 1982): 17–21.

28. A. J. Vermond, “V.L.N. fokkerij,” *IdS* 30 (May 1, 1968): 1–2.

29. "Wetenschap en praktijk op de Uithof," *IdS* 30 (Oct. 1, 1968): 3–5.
30. J. F. Eysink, "Publieke tribune," *IdS* 33 (Apr. 30, 1971): 10–11.
31. In 1978 there was only a single Groninger stallion left, and some one hundred mares. In 1982 a group of fanciers established a separate society to maintain what was left of the original type; H. Bouman, "Nog is het Groninger paard niet verloren," *De Boerderij* 67 (Apr. 7, 1982): 60–63.
32. See for instance G. A. R. Nieuhoff, "Betreurenswaardig," *IdS* 30 (Oct. 15, 1968): 4; A. Heuff, "De Gelderse fokmerriën in Bennekom," *IdS* 41 (Nov. 7, 1974): 1–8; A. J. Vermond, "Het basispaard," *IdS* 43 (Feb. 26, 1976): 3–4.
33. H. Kingmans, "Liefhebbers basispaard vragen aandacht voor hun wensen," *IdS* 46 (Dec. 13, 1979): 70.
34. For the discussions on this topic, see N. M. Strik, "V.L.N.-ers, let op uw saeck!," *IdS* 31 (Feb. 21, 1969): 11; P. van Schaik, "Fokrichting en fokkeuze," *IdS* 32 (Apr. 3, 1970): 1–2; WPN-discussiegroep, "Hoeveel bloed?," *IdS* 39 (July 21, 1972): 3–4.
35. W. Slob, "Welke waarde heeft het exterieur?," *IdS* 40 (Dec. 7, 1973): 4; H. Kingmans, "Kan een springpaardfokkerij toch bestaan?," *IdS* 41 (Dec. 5, 1974): 1–7.
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37. A. M. H. Sängner, "Ervaringen in de volbloedfokkerij en de relatie met de WPN-fokkerij," *IdS* 48 (Nov. 19, 1981): 17–20.
38. "Op-en uitbouw van de WPN-fokkerij. Fokleiding ziet om en kijkt vooruit," *IdS* 48 (Dec. 17, 1981): 9–15; H. Kingmans, "Woorden ten afscheid van P.B. van Binsbergen," *IdS* 49 (Oct. 21, 1982): 3–9.
39. H. Kingmans, "De tijd van de buffels is voorbij," *IdS* 52 (May 9, 1985): 30–34.
40. H. Kingmans, "De fokkerij onderweg (1)," *IdS* 44 (June 2, 1977): 3–7.
41. J. Grijpstra, *Paardenhouderij: paardenfokkerij en paardensport: Discussienota Ministerie van Landbouw en Visserij, Directie Veeboudery en Zuivel* (The Hague: 1977).
42. Slob, *Het Nederlandse paard*, 112–15.
43. *IdS* 45 (July 13, 1978): 12; H. Kingmans, "Paardenwereld in beroering om brief minister," *IdS* 53 (Dec. 4, 1986): 58–60.
44. Johan van Geffen and Ina. Vink, *De winnaar heeft altijd gelijk: Het effect van ingrijpen in de paardenhouderij* (Lelystad: Informatie en Kennis Centrum Landbouw, 1995), 16–17.
45. E. F. Geessink and H. Kingmans, "Behoefte aan en levensvatbaarheid van fokkerijcentrum moet uit studie blijken," *IdS* 45 (Feb. 9, 1978): 3–6.
46. On van der Stee, see [http://www.parlement.com/id/vg09llg9q6zs/a\\_p\\_j\\_m\\_m\\_fons\\_van\\_der\\_stee](http://www.parlement.com/id/vg09llg9q6zs/a_p_j_m_m_fons_van_der_stee) (Accessed Mar. 22, 2017).
47. For a history of these developments, see Bert Theunissen, "Breeding for Nobility or for Production? Cultures of Dairy Cattle Breeding in The Netherlands 1945–1995," *Isis* 103, no. 2 (2012): 278–309.
48. M. P. M. Vos, "Paardenhouderij, een volwaardige bedrijfstak? Aandacht van de overheid," *IdS* 45 (Apr. 6, 1978): 16–18; M. P. M. Vos, "Waarom gaat het Ministerie van Landbouw zich plotseling bemoeien met de paardenfokkerij?," *IdS* 46 (Apr. 7, 1979): 30–33; "Goede sfeer op algemene ledenvergadering," *IdS* 46 (May 3, 1979): 12–13.
49. "Hengstenhouders bijeen," *IdS* 47 (Mar. 20, 1980): 36.
50. On Melchior, see <http://www.horses.nl/sport/springen-sport/springen-algemeen/leon-melchior-overleden/> (Accessed Mar. 22, 2017). Zangersheide was located in Lanaken, just across the Dutch-Belgian southernmost border.
51. Melchior's breeding method was explained in the brochure, "*Zangersheide: fokkerij, de bron van alle paardensport* (Lanaken 1979).

52. *IdS* 51 (Feb. 23, 1984): 5.

53. The plans were first announced in *In de Strengen* in October 1978: “Ministerie actief: Stichting Paardencentrum opgericht,” *IdS* 45 (Oct. 19, 1978): 30. Further details were provided in “Paardencentrum krijgt vooral demonstratiefunctie,” *IdS* 45 (Nov. 22, 1978): 21.

54. “Beleidsnota paardenhouderij op komst. Minister van de Stee: essentie van het initiatief doorzetten,” *IdS* 46 (Mar. 22, 1979): 28.

55. H. Kingmans, “Peiling op ledenvergaderingen. Het WPN in gesprek,” *IdS* 47 (Feb. 7, 1980): 9–12; “Een gesprek tussen het Ministerie van Landbouw en Visserij, het WPN en “Zangersheide”, gehouden op 16 januari 1980. Samenvattend verslag,” *IdS* 47 (Feb. 7, 1980): 29–30; G. J. W. van der Mey, “WPN-jaarrede: In het verleden ligt het heden, in het nu wat worden zal,” *IdS* 47 (Apr. 17, 1980): 19–23.

56. Van der Stee explicated his plans in a policy document: Kamerstuk Tweede Kamer 1979–1980, kamerstuknummer 16027, ondernummer 2, Paarden in Nederland, <http://resolver.kb.nl/resolve?urn=sgd%3Ampg%3A19791980%3A0006962> (Accessed Mar. 22, 2017).

57. “Jaarrede NHS-voorzitter: Minister moet niet buiten organisaties om gaan werken,” *IdS* 46 (Mar. 8, 1979): 11; “Paarden in Nederland” en de Nederlandse paardenhouderij: Een gezamenlijke reactie van het Landbouwschap, de Stichting Nederlandse Draf- en Rensport, de Stichting Nederlandsche Hippische Sportbond [en] de Stichting Nederlandse Hippische opleidingen op de ministeriële nota “Paarden in Nederland” (The Hague: 1980), 6.

58. For the ministerial note, see note 56. For the discussions in parliament, see Kamerstuk Tweede Kamer 1979–1980, kamerstuknummer 16027, ondernummer 5, Paarden in Nederland, <http://www.statengeneraaldigitaal.nl> (Accessed Mar. 22, 2017).

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61. “Open brief aan minister Ir. G.J.M. Braks,” *IdS* 47 (Mar. 6, 1980): 32; J. Hayen a.o., “Ernstige kritiek op plannen in Limburg,” *IdS* 47 (Mar. 6, 1980): 43–44.

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64. H. Kingmans, “Minister wil snel beslissen over paardencentrum en het spel buiten de baan,” Appendix to *IdS* 47 (June 26, 1980).

65. “Het Binnenhof en de Nederlandse paardenwereld,” Extra edition of *IdS* 47 (July 3, 1980): 6.

66. For Braks, see [http://www.parlement.com/id/vg09llhykoyz/g\\_j\\_m\\_gerrit\\_braks](http://www.parlement.com/id/vg09llhykoyz/g_j_m_gerrit_braks) (Accessed Mar. 22, 2017).

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73. H. Kingmans, "Hoe doen de kinderen van WPN-hengsten het in de ruitersport?" *IdS* 45 (May 4, 1978): 3–7; H. Kingmans, "Gerangschikte sportgegevens uiterst waardevol voor de fokkerij; de Duitsers beschikken erover. Wanneer wij?" *IdS* 45 (July 27, 1978): 3–5.

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87. Strikwerda, *Revolutie*, 228–33.

88. W. F. Gerhardt, "Exterieur en prestatie, een noodzakelijk weerwoord," *IdS* 44 (Jan. 27, 1977); H. Kingmans, "De fokkerij onderweg (2)," *IdS* 44 (June 16, 1977): 3–8.

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perform at Grand Prix level in dressage or jumping; see Inez Kampman et al., *The KWPN Horse: Selection for Performance* (Eindhoven: KWPN, 2012), 10–11.

90. Ibid. Science would also become more important in other ways, such as screening for diseases and hereditary defects; see <https://www.kwpn.nl/over-kwpn/diensten> (Accessed Nov. 13, 2017).

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92. For a review of recent work in this area, see Jonathan Harwood, “Did Mendelism Transform Plant Breeding? Genetic Theory and Breeding Practice 1900–1945,” in *New Perspectives on the History of Life Sciences and Agriculture*, eds. Denise Phillips and Sharon Kingsland (Springer, 2015), 345–70.

93. See for instance Margaret E. Derry, *Bred for Perfection: Shorthorn Cattle, Collies, and Arabian Horses Since 1800* (Baltimore: Johns Hopkins University Press, 2003), 48–102.

94. For Bakewell’s breeding system, see Russell, *Like Engend’ring Like*, 196–215.

95. Harro Maat, *Science Cultivating Practice: A History of Agricultural Science in The Netherlands and its Colonies, 1863–1986* (Dordrecht: Springer, 2001), 7–9.

96. Abigail Woods, “Rethinking the History of Modern Agriculture: British Pig Production, c. 1910–65,” *Twentieth Century British History* 23 (June, 2012): 165–91.

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98. Theunissen, “Breeding for Nobility or for Production?,” 292–98.

99. Ibid., 285–86.

100. J. D. van der Ploeg, *De virtuele boer* (Assen: van Gorcum, 2000), 260–65.