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Lessons Learned. Organizing Knowledge in the Friesian Dairy Cluster (C. 1885–1904)

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Abstract

This paper examines the early years of the Friesian Dairy School and is a case study of how knowledge institutions were integrated into a regional economic cluster. The dairy school was the result of cooperation between people and organisations from the economic and political sectors, which inspired the emergence of an industrial dairy cluster. The school had a difficult start because it was not clear whether higher education was a matter of private or public interest. In the discussions about the funding and direction of the school, we can observe how patterns of cooperation in and between the economic sector and the state were shaped. The study shows how cooperative structures originate in processes of trial and error. Cluster evolution can therefore be driven by both discord and consensus within economic networks. The result of such non-linear and multi-scalar developments ultimately reflect a clear differentiation of tasks between economic actors, the state and knowledge institutions.

1 Introduction

The building of cooperative structures between individuals and organisations is given an important position in cluster theories. Geographical proximity eases face-to-face contact, which has a stimulating effect on informal ties. According to this line of thought, regionally entrenched networks instil a group feeling which has a stimulating effect on the establishment of shared knowledge institutions.¹ Many of those involved in current clus-

¹ S. Cruz and A. Teixeira, 'The evolution of cluster literature: shedding light on the regional studies – regional science debate', *Regional studies* 44:9 (2010) 1263–1288, 1266.

ter policies concentrate their activities on the establishment of infrastructure for research, development and vocational training. Such strategies have also proved to have influenced the development of economic clusters in the past. As a consequence of the Industrial Revolution, territorially bounded rural production systems were confronted with new technological possibilities for the processing of their agricultural commodities. Production methods became more complex and one way of responding to the challenge this posed was to establish institutions which trained primarily young people in how to exploit these new economic opportunities. Major obstacles, however, were the investment costs of building knowledge institutions. Who should pay for the schools, laboratories, research centres and so on? The answers were far from clear in the last quarter of the nineteenth century. Ideological barriers and practical impediments held back the agricultural knowledge infrastructure in the Netherlands compared to other European countries.²

Clusters have helped overcome these barriers and impediments. Professional lobby groups, organised by regional networks, laid the foundations for agricultural schools. The building of a *national* infrastructure was a minor issue for the representatives of these networks, who were embedded in particular agricultural traditions. These actors were driven foremost by the conviction that knowledge was a crucial asset in order to modernize their regional economic production systems. It would be inaccurate, however, to attribute the foundation of schools to regional initiatives alone. Knowledge infrastructures were in fact bolstered by extra-regional forces; knowledge driven development of clusters was not a simple bottom-up process. A recent and critical evaluation of the cluster literature called for a 'further understanding of how factors at different geographic scales interact and influence cluster development paths'.³ This article aims to contribute to such a multi-scalar perspective on cluster development. Moreover, it wants to study the inevitable dynamics which arise between individuals and organisations who are working together on shared facilities for education and vocational training. Some parts of the cluster literature emphasize the importance of social and cultural aspects, and this may give observers (unintentionally or not) the feeling that cluster evolution comes along with

² L. van Molle, 'Kulturkampf in the countryside. Agricultural education, 1800-1940: a multifaceted offensive', in: C. Sarasúa, P. Scholliers and L. van Molle, *Land, shops and kitchens. Technology and the food chain in twentieth-century Europe* (Turnhout 2005) 139-169; N. Vivier (ed.), *The state and rural societies. Policy and education in Europe 1750-2000* (Turnhout 2008).

³ M. Trippel, M. Grillitsch and A. Isaksen, 'Perspectives on cluster evolution: critical review and future research issues', *European planning studies* 23 (2015) 2028-2044, 2037.

a sphere of consensus. But among those aspects that influence clusters, many can be characterized by disputes and competition.⁴

The multiple levels and the internal dynamics of cluster development will be investigated with the help of a dairy school built in the Friesian town of Bolsward. It was founded as a private initiative in 1889, closed in 1899 and reopened in 1904 as a state school. We will track the organisational history of the Friesian dairy school, which was characterized by discussions with and between economic actors and the national state. Internal tensions were overcome through a process of trial and error, in which each actor adapted its expectations of the school and of the role each would play. New cooperative structures were built by adapting to new circumstances, thus fostering the emergence of a Friesian industrial dairy cluster with a knowledge institution. Against this background, the central questions addressed by this article focus on actors and the cooperation between them: who was involved in the foundation of the first (1889) and second (1904) dairy schools and how did they cooperate? How did the ideas about and expectations of the dairy school change? The primary sources used for this article – besides newspapers and the archives of the Friesian Agricultural Society – are the archive of the Friesian Dairy School, the archive of the Department of Education of the Ministry of Internal Affairs, and the archive of the National Agricultural Commission. The article is structured as follows. First, we will place the case study more explicitly in its historiographical context. Then we will embark on the ideological reasons for the quite late foundation of a Dutch–Friesian dairy school, compared to other European countries. We will then provide a sometimes quite detailed description of the foundational process between 1885 and 1904. In our conclusion, we will again relate the case study to the broader theme of cluster development.

2 Historiographical overview

In the literature, Friesland is viewed as a core region of the Dutch dairy industry. Its literal basis is the clay and peaty soil in the southwestern and central parts of the province, on which rich pastures could develop. Even in

4 J. Zeitlin, 'Industrial districts and regional clusters', in: G. Jones and J. Zeitlin (eds.), *The Oxford handbook of business history* (Oxford 2008) 219–243, 226

preindustrial times, these areas specialized in dairy farming, with large and professional agricultural firms distributed evenly across the region.⁵ Manually creamed milk was churned into butter, which was sold through market towns such as Sneek and Leeuwarden to urban markets in the western Netherlands. In the eighteenth and nineteenth centuries, the English market developed as a main buyer of Friesian butter, which was shipped from the harbour of Harlingen. The transformation from manual to mechanized dairy production has been described as a process dominated by hesitance: Friesian farmers underestimated the opportunities presented by new technologies. Partly based on sources from critical eyewitnesses, this view entered the historiography through the evaluation in the 1950s of the work of the Dutch 'Danish Commission'.⁶ This commission was established in 1878 to learn from German and Scandinavian dairy production. The commission dismissed importing into the Netherlands the system of processing milk from several farms at a central location, as was done in Denmark. According to three elderly commission members, this conflicted with the Friesian butter production methods in medium-sized, family-owned farms. This stance was rather traditional, so in a sense the historiography is correct. However, at that time it would hardly have been possible to foresee the technological breakthrough of 1879, when the Swedish engineer Gustav de Laval perfected an earlier prototype mechanical milk separator.⁷ Working with the machinist Alva, this Alva de Laval separator entered the Dutch market in the 1880s.⁸ It enabled large quantities of milk to be creamed very quickly and easily, making it profitable to establish dairy companies and separate butter and cheese production from dairy farming. This transformation has been described in many articles and books, and is part of the

5 J.J. Spahr van der Hoek, *Geschiedenis van de Friese landbouw*, dl. 1 (Leeuwarden 1952) 113-122; M. Knibbe, *Lokkich Fryslân: een studie naar de ontwikkeling van de productiviteit van de Friese landbouw 1505-1830* (Groningen 2006).

6 J.P. Wiersma, *Erf en wereld. Over de agrarische toestand in Friesland na 1870* (Drachten 1959) 34-36; Spahr van der Hoek, *Geschiedenis*, dl.2, 234.

7 M.S.C. Bakker, 'Boter', in: H.W. Lintsen (ed.), *Geschiedenis van de techniek in Nederland. De wording van een moderne samenleving 1800-1890*, Deel I. Techniek en modernisering. Landbouw en voeding (Zutphen 1992) 103-133.

8 J. Bieleman, 'The emergence of mechanized dairying in the northern Netherlands, and particularly in the provinces of Drenthe and Friesland', in: Y. Segers, J. Bieleman and E. Buyst (eds.), *Exploring the food chain. Food production and food processing in Western Europe, 1850-1990* (Turnhout 2009).

Friesian historical canon. Many of these works focus on the description of individual companies, or a group of companies. The cooperative movement has been a particular focus of many historical works.⁹ Although these works do consider the connections between individuals and organisations, there is still need for a more systematic approach to the connections between the individuals and organisations which made up the Friesian dairy cluster.

This becomes clear when we consider the history of Dutch and Friesian knowledge institutions in more detail. The historiography of agricultural education in the Netherlands is characterized by general overviews and studies of individual schools and groups.¹⁰ Some provide extensive or more concise descriptions of the wide variety of schools, and how they were incorporated in the evolving state educational policies.¹¹ Of note is the history of the State Agricultural School in Wageningen (*Rijkslandbouwschool*), which was founded in 1876.¹² This school developed into the academic centre of Dutch agriculture in the twentieth century, much to the disappointment of Groningen, where an agricultural school had been founded in 1842. That school was closely connected to the University of Groningen, but it did not succeed in achieving the status of a state school and had to close in 1870, including its practical facilities in the nearby village of Haren.¹³ Schools with a focus on particular branches of agriculture were also short-lived. Among them were the Horticultural School in Watergraafsmeer/Amsterdam (1867–1882), the School for Forestry in Frederiksoord (1887–1892), and the Dairy School in Oudtshoorn, which was

9 K. Tjepkema, *Dat is 't kondensfabryk: een halve eeuw coöperatieve condensindustrie in Friesland* (Leeuwarden 1963); C.F. Roosenschoon, *Bakens in de tijdstroom. Een kenschets van de Bond van Coöperatieve Zuivelfabrieken in Friesland bij het 75-jarig bestaan, 1897-1972* (Leeuwarden 1972).

10 M. van den Burg, *Geen tweede boer. Gender, landbouwmodernisering en onderwijs aan plattelandsvrouwen in Nederland, 1863–1968* (Wageningen 2002).

11 N.B. Goudswaard, *Agrarisch onderwijs in Nederland 1783–1983* (Culemborg 1986); P. Kooij, 'Het landbouwonderwijs in de twintigste eeuw', in: M.G.J. Duijvendak, E.H.K. Karel and P. Kooij, *Groen Onderwijs. Terugblik en uitzicht naar aanleiding van het 100-jarig bestaan van de Vereniging voor Hoger Landbouw Onderwijs 1906-2006* (Groningen and Wageningen 2008) 9–42; H.A. Benda, *Weten en laten weten. 100 jaar onderwijs, voorlichting en onderzoek in de landbouw* (The Hague 1976).

12 J. van der Haar, *De geschiedenis van de Landbouwuniversiteit Wageningen* (Wageningen 1993).

13 R. Paping, 'Die waardige man'. Prof. H.C. van Hall (1801–1874), *botanicus, landhuishoudkundige en pionier van het hoger landbouwonderwijs* (Groningen 1996) 178. In the small town of Warffum, also located in the province of Groningen, another agricultural school started in 1870 as a division of a school for higher secondary education (HBS), but it closed in 1875.

planned in 1881, opened in 1889 and closed in 1892.¹⁴ Several reasons have been offered for these schools' failure in discussing the difficulties they faced, including controversies about the curriculum, financial deficits and a shortage of professional teachers.¹⁵ Only the School for Horticulture in the Drenthe village of Frederiksoord, established in 1884, survived until 2004.¹⁶ The Friesian dairy, which was crucial within the development of the Friesian dairy cluster, was short-lived too. It started in 1889 as a private initiative but was closed in 1899. It opened again in 1904, but this time as an official institute of the Dutch state. It was one of the first schools of higher education in agriculture and agribusiness, but it has not yet been the subject of any in-depth historical research paying attention to its relationships and position in a broader regional economic network.¹⁷

Occasionally, the cited works do consider the extent to which schools are bound up in regional networks, although this is never the main focus. This might be related to the observation of Segers and Hermans, who stated that 'agricultural education was mainly a top-down affair' in most European countries.¹⁸ However, we can see the influence of regional contexts even within national knowledge institutions.¹⁹ Moreover, literature on agricultural schools from other countries have studied the place based characteristics of educational facilities, and the regional contexts that influenced knowledge infrastructures. The Swedish government, for example, subsidized agricultural schools as early as the 1830s. Institutional frameworks provided broad scope for initiative to local parishes, so that agricultural schools were unevenly distributed across the country.²⁰ In 1840 the Grand Duchy of Tuscany established an academic institute for agriculture, thus marking the passage from private to public initiatives in

14 R.H. Rijkens, 'Landbouwonderwijs', in: *De Nederlandsche landbouw in het tijdvak 1813–1913* (The Hague 1913) 91–130, 125.

15 Goudswaard, *Agrarisch onderwijs*, 157.

16 F. van der Bij, *Gerard Adriaan van Swieten Tuinbouwschool. Frederiksoord 1884-1984* (Frederiksoord 1984).

17 For descriptive overviews, see: Van der Hoek, *Geschiedenis dl. 2*, 247-250; G.L. Hemink et al. (eds.), *75 jaar levensmiddelen-technologie Bolsward* (Meppel 1979).

18 Y. Segers and R. Hermans, 'Between ideology and science: higher agricultural education in Belgium and the development of a Catholic agricultural network, 1850–1914', *Agricultural History Review* 57:2 (2009) 236–256, 239.

19 For an analysis of how academic research is inspired by the regional contexts of universities, see: K. Melis and M. Molema, 'Wetenschap in een regionale context. Sociologie en economie aan de Rijksuniversiteit Groningen', *Studium* 5:2, 95–109.

20 A. Nilsson and L. Pettersson, 'The state or the people? Government policies and popular movements in education and training in 19th century Swedish agriculture', in: N. Vivier, *The state*, 215–230.

Italy. The goals and curriculum of the school were highly affected by the agricultural system of Tuscany.²¹ The implementation of agricultural education in other countries was rife with complications, though, and initial plans had to be adapted. However, they were all ahead of the Netherlands. This might have been because of the structure of Dutch agriculture. In the early twentieth century the agricultural expert Rijkens stated that the Netherlands lacked an agricultural elite who could stimulate and/or facilitate the emergence of an educational system for agriculture.²² This could be explained by the low demand for the subject. With reference to enrolment numbers, some historians have argued that there were not many students who wanted to be trained in agriculture.²³ This was most likely true of peasant farmers who trained their children on their own (small) farms. The need for agricultural education may therefore have been low. For the sons and daughters of dairy processors this was certainly true. Before the introduction of new technologies, people were trained entirely on the job. But in the latter quarter of the nineteenth century dairy production methods transformed from manual to mechanical. This transformation increased the complexity of the production process, resulting in a commensurate increase in the demand for sound education.²⁴ The demand for education could be strongly regionally rooted, as the Friesian dairy school indicates.

3 A change in ideologies

In a literature synthesis the economists Cruz and Texeira sketched out the three ‘most relevant’ elements of the cluster concept: geographical proximity, social networks and a shared culture.²⁵ How do these elements express themselves in the Friesian dairy cluster? The Friesian clay and peat soils – the perfect land for growing grass which cows eat and process into milk – were fundamental to the cluster. From the Middle Ages on, Friesians specialized in dairy farming which yielded an excellent export base in

21 R. Pazzagli, ‘From private initiative to state intervention: the origins of public agricultural education in Italy’, in: Vivier, *The state*, 231–246.

22 Rijkens, ‘Landbouwonderwijs’, 92.

23 Paping, ‘*Die waardige man*’, 181; Kooij, ‘Het landbouwonderwijs’, 11–12.

24 In other branches of agribusiness, a similar quest for education was at stake, see for example: M.S.C. Bakker, ‘Industrieel onderwijs en de Nederlandse suikerindustrie’, *Jaarboek voor de geschiedenis van bedrijven techniek 2* (1985) 151–172.

25 Cruz and Teixeira, ‘The evolution’, 1266–67.

the nineteenth century. In 1865, Harlingen exported over 11 million kilograms of butter, around three quarters of all Dutch butter exports in the period. The majority went in forty-kilo barrels from Friesland to London; England bought forty percent of its imported butter from the Netherlands.²⁶ Their commercial success gave the Friesian dairy farmers a sense of group identity. Large farm-owners met each other and mixed with notable citizens in the Friesian Society of Agriculture and Cattle Breeding. This association ('the Society') was founded in 1852 and pursued the economic interests of the agricultural community. At its annual meetings, the members of the Society discussed several themes, such as trade policies or new production methods. Organised into thirteen local departments, the geographical reach of the Society was extensive. The Society can be regarded as a social network for the Friesian agricultural sector during the nineteenth century, a network which was characterized by a conscious cultural identity backed by economic success.

In the last 25 years of the nineteenth century, however, a dramatic sense of disaffection took hold over Friesian dairy farmers. Their traditional methods of producing butter on their own farms was challenged by organisational and technological innovations. National competition rose because of the less expensive substitute, margarine, which took some market share from 'real' butter.²⁷ Moreover, foreign competition increased. The fall in the Dutch market share of English imports offers some indication: it sank to eight percent in 1890.²⁸ Denmark in particular was regarded as the great competitor. New research into the Danish dairy sector underscores contemporary reports that its success resulted from knowledge-driven measures.²⁹ Danish knowledge infrastructures were stimulated by the national government, which played a far more active role compared to the Netherlands. For the greater part of the nineteenth century the relationship between the economic sector and the Dutch state was characterized

26 V.R.IJ. Croesen, *Geschiedenis van de ontwikkeling van de Nederlandsche zuivelbereiding in het laatst van de negentiende en het begin van de twintigste eeuw* (Den Haag 1932) 192–196; Spahr van der Hoek, *Geschiedenis*, 484.

27 The substitution of butter by margarine cannot be quantified exactly, but some numbers are telling: butter exports from the Netherlands to England decreased with 66 percent between 1884 and 1888, whereas margarine exports increased with 59 percent in the same period. See: Bakker, 'Boter', 108.

28 Croesen, *Geschiedenis*, 192, 195.

29 I. Henriksen and K.H. O'Rourke, 'Incentives, technology and the shift to year-round dairying in late nineteenth-century Denmark', *Economic History Review*, 58:3 (2005) 520–554; M. Lampe and P. Sharp, 'Just add milk': a productivity analysis of the revolutionary changes in nineteenth-century Danish dairying' *Economic History Review* 68:4 (2015) 1132–1153.

by its liberal principles, with politicians adopting a *laissez-faire* attitude. At the time, Dutch politicians were convinced that the state should not be actively involved and that initiatives to improve agricultural education should come from society itself. Once an initiative was serious and well organised, the state would then support it with subsidies based on the 1862 Secondary Education Act.³⁰

There was a thin line between state reluctance and the outright rejection of all initiatives, however. Proposals for the foundation of an agricultural school from the local administrators of Franeker (1866) and Dokkum (1880) were refused by the national government.³¹ The modest role of the state made it easy for politicians and the responsible ministers not to spend any effort and resources on local initiatives. This political climate explains why the Society was not involved in lobbying for schools in Franeker and Dokkum. Members of the association were rather liberal too, they were self-confident, trusted in their independence and were, on average, not in favour of strong state involvement. The general sense of disquiet from about 1875 onwards was the first sign that the liberal doctrine within the Society was losing ground. Inspired by the loss of market share and the fall in butter prices, a sense of urgency spread within the Society. The insistence on strategic action was expressed by new and in most cases younger members. For example, in the annual general meeting of 1882 the newly elected president, Dirk Fontein de Jong (1836–1898), stated that agriculture deserved ‘strong support’ from the government.³² Fontein de Jong was director of a flax factory and also a deputy on the provincial board of the Friesian regional government (*Gedeputeerde*). Moreover, he was a member of the commission which advised the government from 1887 to 1890 on agricultural policies (*Landbouwcommissie*). He became, as we will see, a key figure in the foundation of the Friesian Dairy School.

In the first year of Fontein de Jong’s office, the issue of agricultural education was put on the agenda by a young school master called Vitus Bruinsma (1850–1916). In his doctoral thesis in chemistry, for which he

30 Documents of the House of Representatives, 1862–1863, no. XXXIX/2 ‘*Ontwerp van wet tot regeling van het middelbaar onderwijs*’. Article 19 on agricultural education was amended by parliament, but the possibility of state interventions in agricultural schools survived, see: J.M.G. van der Poel, *Het Landbouwonderwijs in Nederland tot 1918* (Wageningen 1976) 92.

31 *Landbouwcourant*, 21 February 1867; Tresoar Provincial Archive Friesland (further PA), Archive of the Friesian Agricultural Society (inventory no. 144, further AFAS), dossier no. 928, Letter from the Ministry of Internal Affairs to the Board of the Friesian Agricultural Society, 7 January 1881.

32 Minutes of the annual general meeting of the Friesian Agricultural Society, 15 December 1882, in: *Mededeelingen en Berigten* (from now *MenB*) 15 (1882) 75.

received a PhD in 1875, Bruinsma proposed that education should be compulsory.³³ After his intervention at the annual general meeting of 1882, Bruinsma was invited by the board of the Society to expand his ideas, which he did in a report published in March 1884.³⁴ Under the Bruinsma plan, agricultural education in Friesland should comprise basic training in physics, chemistry, botany and zoology. Practical education within a three-year course would be conducted on a farm connected to the school. Moreover, both arable and dairy farming would be included in the Friesian curriculum. Investment in the establishment of the school was calculated along with its running costs.

Once the debate on his report began, Bruinsma must have been disappointed with the results.³⁵ The Society soon agreed on the basic principle that agricultural education should focus on youth. The method of education was highly disputed, however. At the core of the conflict were the different kinds of knowledge. On the one hand, many members of the Society clung to a practical type of knowledge, connected to the craft of farming and the skills involved. On the other hand, some influential members advocated scientific knowledge, which empowered farmers with the ability to deduce and experiment. These different types of knowledge led to discord not only in Friesland, but also at a national level and abroad.³⁶ Quite a few members of the Society had doubts about the need for theoretical education for future farmers. Their scepticism was increased by the high investment needed for a school and the cost to parents, whose children were the school's targets.

33 V. Bruinsma, *Over de electrolyse van organische stoffen in het bijzonder van zuringzuur* (Leeuwarden 1875), 100.

34 'Een Landbouwschool in Friesland. Rapport aan het Hoofdbestuur der Friesche Maatschappij voor Landbouw over de vraag: Hoe Friesland op de beste wijze kan geraken in het genot van theoretisch en practisch landbouwonderwijs?', in: *MenB* 17 (1884) 8–44. Bruinsma acted as the rapporteur with two other commission members.

35 Minutes of the annual general meeting of the Friesian Agricultural Society, 13 August 1884, in: *MenB* 17 (1884) 68–77.

36 'Verslag van eene vergadering tot bespreking van de meest doeltreffende middelen waardoor het Landbouw-onderwijs, hetzij door de Hooge Regeering, hetzij door provinciën, gemeenten, maatschappijen of particulieren, in Nederland kan worden in het leven geroepen', *Nieuwe Boeren-Goudmijn* (1872) issue 12; J. Harwood, *Technology's dilemma: agricultural colleges between science and practice in Germany, 1860-1934* (Oxford 2005).

4 Caught between economic actors and the state

Certainly, the founding of a Friesian school was not the result of a harmonious process grounded in a stable, conflict-free culture. The situation reminds us of the historical critique of the idea that geographical proximity leads to cultures of trust and cooperation.³⁷ History abounds with evidence to the contrary, where proximity is accompanied by discord and quarrels. From this critical perspective, the cluster literature idealizes cultural aspects and often overlooks situations of discord and competition. However, in this debate, the development of economic clusters can be regarded in the light of either a consensus or a discord framework. Discord and consensus do not exclude each other; both can have their positive and negative effects on cluster development. Moreover, both can operate at the same time, as happened in the process of founding the Friesian Dairy School.

After Bruinsma left the stage, his leading role was taken over by Dominicus van Konijnenburg (1841–1905). Van Konijnenburg was well-informed on the educational question because he was president of the department where Bruinsma first started lobbying. His departmental presidency also made him a member of the general board of the Society. In addition, he was secretary of the prestigious *Friesch Rundvee Stamboek*, the official register of Friesian cows. As an influential man of good reputation, he intervened in the debate which reopened in 1885.³⁸ His approach to overcoming the stalemate was to focus on *dairy* education, and thus lower the investment costs. Van Konijnenburg proposed a modest facility for three months of training at the most, similar to German dairy schools (*Molkerei Schüle*) which were private institutions. Young women aged from 16 to 18 would receive practical training, whereas young men would be trained in mechanical dairy processing methods.³⁹ In addition to the gender-specific training, what is most interesting in Van Konijnenburg's interventions is that he includes both the traditional methods and the new, industrial techniques in his plan. The Van Konijnenburg-plan is therefore typical of the transitional phase of the Friesian dairy cluster. From 1871 on, debate on industrial dairy processing meandered in the Friesian as well as the na-

³⁷ Zeitlin, 226; Lars Nyström, this issue.

³⁸ 'Extraordinary meeting of the board of the Friesian Agricultural Society', 25 February 1885, in: *MenB* 18 (1885) 5–26.

³⁹ Idem., 19; 'Addendum B [memo Van Konijnenburg] of the extraordinary meeting of the board of the Friesian Agricultural Society', 25 February 1885, in: *MenB* 18 (1885) 34–36.

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tional agricultural society.⁴⁰ Hardly any Friesian farmers had changed their production systems, however, so the Bruinsma plan was only slightly affected by this debate.

In the early 1880s, however, new events meant that industrial dairy processing would soon change from being a futuristic possibility, to a reality which was rapidly taking shape. The first dairy factory, 'Freia', was erected in 1879 in Veenwouden. This town in the east of the province was relatively remote from the cluster's western heartlands. Moreover, it did not use a mechanical centrifuge, which entered the market in the same year that Freia was erected. Three companies were founded in 1882 on the basis of this new technology. Their locations – Leeuwarden, Bolsward and Sneek – were the more central dairy production sites in Friesland.



Illustration 1. The first dairy school (1889-1899) in Bolsward. Mr. K. Tromp was the architect of the building. Source: collection J. Wijma, Bolsward.

⁴⁰ Van den Burg, *Geen tweede boer*, 107–110.

was that it is unlikely that any of these schools taught industrial dairy processing. The article merely restated that these countries had outsold Friesian dairy products on the English market, meaning that the foundation of a Friesian dairy school was urgent. This article was probably written by Van Konijnenburg, who was a prolific writer of journal articles. Ten days after the publication of the article, the Society's general board decided by sixteen votes to four, after consulting each of the thirteen departments, to commit itself to a school focused on dairy farming, instead of a combination of arable farming and dairy training.⁴³ An important argument for this choice, we can conclude, was the threat of international competition and the fear of wiping out the Friesian industry.

A commission, established in the spring of 1886, was made responsible for the legal and financial preparation of the foundation.⁴⁴ Among its members were the president of the Society, Fontein de Jong, as well as Van Konijnenburg, whose ideas were a leading force in the school's organisation.⁴⁵ The school became an independent institution with a dual curriculum: training for manual and industrial processing techniques, just as Van Konijnenburg desired. On 6 March 1888 the King approved the statutes for an 'association for vocational education in dairy preparation in Friesland' ('Dairy School Association').⁴⁶ The Dairy School Association was based in Bolsward, because this town in the west of the province made the most attractive bid, offering financial and organisational contributions to the school. Alongside the municipality, the Bolsward-based *Gasthuisfund* backed the initiative with modest financial resources. Bolsward was at the time an important town for the Friesian dairy cluster. It was located in the middle of the traditional 'pasture corner' (*Greidehoek*) and housed one of the first dairy companies.

43 'Minutes of the extraordinary meeting of the board of the Friesian Agricultural Society', *MenB* 18 (1885) 5-26.

44 Minutes of the board meeting of the Friesian Agricultural Society, 23 April 1886, in: *Mededeelingen en Berichten*, 15 May 1886. During 1885 it was decided to publish *Mededeelingen en Berichten* on a weekly basis – this changes the way how we will refer to the Society's journal after 1885 too.

45 D. van Konijnenburg, 'Open letter to the board of the Friesian Agricultural Society', *Mededeelingen en Berichten*, 15 February 1886.

46 Addendum *Nederlandsche Staatscourant* no. 85 (10 April 1885), 11.

Table 1. Subsidies for the Dairy School in guilders (1890)

National government	2.000,-
Province of Friesland	1.000,-
Municipality of Bolsward	500,-
Members of the Dairy School Association	445,-
St. Anthony Gasthuisfund	300,-
Other	267,-

Source: National Archives, Archive of Internal Affairs (2.04.10), inv. 683, Financial report 1890 Dairy School.

Most crucial in the foundational process, however, was the state's involvement. The coming together of the economic actors and the state became evident through their financial and organisational ties. The province of Friesland was the first state organisation which was prepared to provide an annual subsidy to such activities in the common good. The national administration was the most important annual financier (see table 1). In order to organise and legitimize the assistance from the Ministry of Internal Affairs, which was responsible for education policy at the time, the Friesian Dairy School had to be incorporated into national political structures. The Friesian initiatives coincided with a national trend for greater state involvement in agricultural matters. In the last fifteen years of the nineteenth century political involvement, instigated by the agricultural crisis of the 1880s, gave rise to a Dutch 'agricultural institutional matrix'.⁴⁷ The Agricultural Commission, consisting of twenty-five members selected for their academic, political and agricultural experience, played a central role in this process. During the period from 1887 to 1890 it issued several recommendations on quality control systems, research and development, education and land use. One of its first recommendations was on the provision of help to agricultural schools for vocational training.⁴⁸

This recommendation was crucial for legitimizing state involvement in the Friesian dairy cluster. Regional interests overlapped with the national interest in a strong agricultural sector. Fontein de Jong, president of the Society and a member of the Agricultural Commission, was the main ar-

⁴⁷ A. Schuurman, 'Agricultural policy and the Dutch agricultural institutional matrix during the transition from organised to disorganised capitalism', in: P. Moser and T. Varley (eds.), *Integration through subordination. The politics of agricultural modernisation in industrial Europe* (Turnhout 2013) 65–85; J. Bieleman, *Boeren in Nederland. Geschiedenis van de landbouw 1500-2000* (Amsterdam 2008) 310–313.

⁴⁸ 'Advies over de wenschelijkheid om landbouwwakhscholen van Staatswege te subsidiëren', *Staatscourant*, 14 May 1887.

chitect of this recommendation. As president of the Friesian Agricultural Society, he had contacted the Minister of Water Management, Trade and Industry. The Minister forwarded Fontein de Jong's request for a subsidy to the Agricultural Commission.⁴⁹ In a clever double move Fontein de Jong used his own letter to the Agricultural Commission as part of a successful bid to gain backing for the Friesian initiative.⁵⁰ As a result the Friesian Dairy School was able to receive assistance before the Agricultural Commission issued its advice on the national system of agricultural education.⁵¹ Thanks to Fontein de Jong, an item for the assistance of agricultural schools for vocational training was included in the state's budgetary plan of 1888. One year later, eight farmers' sons with an average age of twenty-two started their education at the new dairy school.⁵²

5 Cultural adjustment

It soon turned out that the school's curriculum was too much a product of compromise to be successful. Originating in the Van Konijnenburg-plan, both the old and the new mechanical techniques for making butter and cheese were taught. We must recall that the author of this plan spelled out this dual character while representing a society many members of which were sceptical about teaching agricultural theory. Nevertheless, theoretical courses in the natural sciences, physics, chemistry, botany and zoology were taught during the afternoon. With hindsight, these theoretical courses were remarkable, because Van Konijnenburg and others had only emphasized the need for practical training. The theoretical courses were, however, a concession to the Ministry of Internal Affairs, whose inspector criticized the limited amount of theory to be taught when he read the draft curriculum.⁵³ This resulted in the inclusion of more theoretical courses within the three-month course.

Despite these adaptations to the Van Konijnenburg plan, the school still

49 NA, Archive of the Agricultural Commission (inventory no. 2.11.25, further AAC), dossier no. 2, minutes of the board of the Agricultural Commission, 19 January 1887.

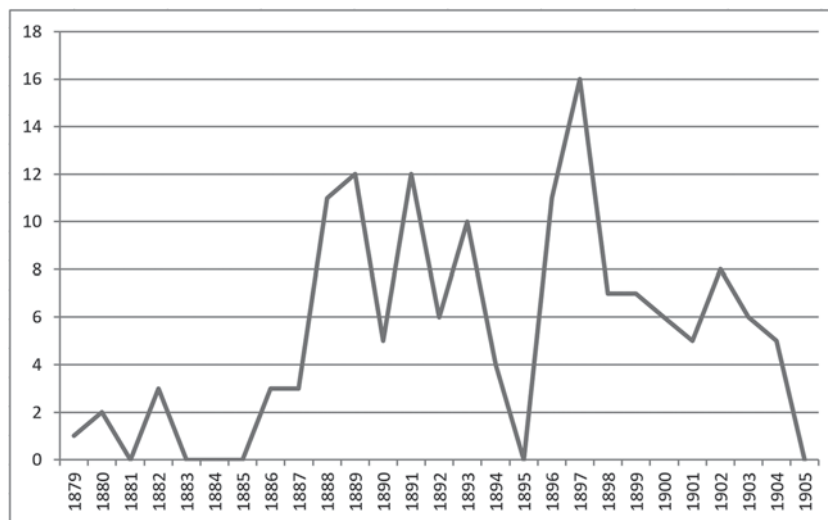
50 NA, AAC, dossier no. 2, minutes of the Agricultural Commission, 4 April 1887.

51 'Advies betreffende de regeling van het landbouwonderwijs', *Staatscourant*, 30 May 1888.

52 NA, Archive of Internal Affairs, dept. of Education (inventory no. 2.04.10, further AIAdE), dossier no. 683, Verslag van den toestand en de werking van de Zuivelschool te Bolsward. 4 november 1889 – 1 maart 1890.

53 NA, AIAdE, dossier no. 683, Nota betreffende het programma van onderwijs & het onderwijzend personeel aan de op te richten School voor Zuivelbereiding, 6 juni 1888.

did not meet its high expectations. Dynamic economic developments increased the mismatch between the goals envisaged by the school's founders and the expectations of the students as well as and particularly of the emerging dairy industry. Industrial dairy companies were growing fast from 1885. The first cooperative dairy factory was erected in 1886, the second followed in 1887 and in 1888, ten cooperative dairy companies were founded in a single year (see Figure 2). However, the curriculum was not substantial enough for the responsibilities required for managing a dairy factory. There was a great deal of discomfort at this, which illustrated how difficult it is to reach consensus in times of change. Expectations of the school were rooted partly in the pre-industrial period, but because of the rapid industrial development, these expectations were disappointed by those stakeholders involved, leading to fresh discussions.



Graph 1.

Source: Cultuurhistorische Kaart Friesland.

The discussions between the founders of the Friesian Agricultural Society, the Dairy School Association, and the representatives of the state aimed to reach a new consensus. In an attempt to better align educational objectives and societal demands, a reorganisation process was started. The Association board members decided to focus entirely on industrial

dairy processing in November 1892.⁵⁴ This dissociation from practical training in dairy processing on the farm was preceded by a recommendation from F.B. Löhnis (1851–1927), who took office as the first inspector of agricultural education in 1892. Löhnis took a broader view. A school linked to a farm had been opened in the province of South Holland, whereas the Friesian school tended more towards training for industrial processing. A national division of tasks helped legitimize the focus on industrial dairy processing in Friesland. The first new course started in July 1894 and was extended from three to six months. Nevertheless, after this first reorganisation the problems were not solved. Students still lacked the practical and theoretical background to understand all their courses. Moreover, feedback from dairy companies indicated that the alumni were not well enough equipped to manage tasks in factories. Dairy product sales were also unprofitable, with the cost of natural resources leading the returns and endangering the school's future. The director of the school complained that he did not have enough time for the theoretical courses, because the milk (which was delivered daily) had to be processed with the students' help.

In an attempt to reach an unified solution to all these problems, a second reorganisation process was started in 1898. The initiator of this process was Johannes Mesdag (1850–1932). Mesdag combined his chairmanship of the Dairy School Association with his role as dairy counsellor to the Friesian Agricultural Society.⁵⁵ Mesdag's academic training was in physics. He was an influential man who stood out for his engagement with students and his knowledge, and for his tenacity. Under his chairmanship, the Dairy School Association flourished and eventually his reorganisation plan was embraced by all stakeholders in the cluster, including Löhnis. Proposals for statutory changes led to a clear mission statement: the school focused 'entirely on theoretical education' and its target group was described as 'those who wish to be appointed as the director of a dairy company' later on in their careers. Admission requirements were expanded. Students had to have practical training in a dairy company for at least one year. This, and other more detailed aspects of the curriculum, were approved by all members of the association.⁵⁶ More difficult was the

54 Archival depot of the Ministry of Economic Affairs, Deventer, non-inventoried Archive of the Friesian Dairy School, minutes of the board meeting of the Dairy School Association, 19 November 1892.

55 S. de Boer, 'Bruggenbouwer tussen wetenschap en praktijk: de zuivelconsulent in Fryslân rond 1900', *De Vrije Fries* 96 (2016) forthcoming.

56 Idem, General Meeting of the Association, 23 December 1899.

question of whether the school had to move to Leeuwarden or stay in Bolsward. New courses had to be postponed in 1900 in expectation of the reorganisation, which was never reported by the Dairy School Association. The question of where the school should be based was so controversial that the Association was liquidated in 1901 and dairy education in Friesland was taken over by the state.

6 Cluster dynamics

To understand the turmoil surrounding the decision as to where the Friesian Dairy School should be based, we should take into account the establishment of Leeuwarden as the centre of the Friesian dairy cluster. Because of the rise of the industry in the last fifteen years of the nineteenth century, several regional organisations were founded and located in Leeuwarden. The most important of them was the Union of Cooperative Dairy Factories, which was established in 1897. This was led by pioneers of the Friesian dairy industry. The board of the Union of Cooperative Dairy Factories consisted of outspoken and self-made men, who appointed a secretary to look after the interests of cooperative dairy factories on a full-time basis. The union was not that enthusiastic about the school.⁵⁷ Led by autodidacts, the union's board believed that training on the job was by far the most effective way of becoming the boss of a dairy factory.⁵⁸ Because of their scepticism, they demanded that the school be moved to Leeuwarden in return for their cooperation. This cooperation was greatly needed, because a crucial part of Mesdag's reorganisation plan was the training of students in dairy factories. This preparatory phase required close cooperation between the school and dairy factories, a cooperation which could be managed by the Union of Cooperative Dairy Factories.

Moving the school to Leeuwarden would be a blow to Bolsward, so in late 1899 it was put to a vote at a general meeting of the Dairy School

⁵⁷ Idem, Meeting between the board of the association and the board of the Union of Cooperative Dairy factories, 8 March 1899.

⁵⁸ Wiersma, *Erfen Wereld*, 147–148.

Association, where it was decided by 25 votes to 13 to remain in Bolsward.⁵⁹ This decision provoked strong opposition from the union, as well as the Friesian Agricultural Society, whose headquarters were also in Leeuwarden. They protested to the Minister of Internal Affairs.⁶⁰ The Minister, however, sought advice from the Friesland administration. He wrote to the King's Commissioner, the highest state official in the Dutch provinces. In his reply the Commissioner ignored the question of where the school should be based. He felt the fundamental problem was its private nature, which he saw as the reason why it had been ailing for years. In order to establish an adequate educational system, he felt that the school should become a state institution.⁶¹

In 1900 the Friesian Dairy School reached a crossroads: should it continue as a state subsidized, private institution or be completely financed and directed by the state? The question was delegated from the Minister to H.J. Lovink (1866–1938). Lovink was the highest official (director general) of the Department of Agriculture, which was founded in 1898 under the umbrella of the Ministry of Internal Affairs. This was one of the results achieved by the Agricultural Commission which advised the government from 1887 until 1890. Under his leadership a series of state institutions for agricultural research and education were founded.⁶² Lovink pushed for the Friesian Dairy School to become an official state institution. Investment was set aside in the 1901 budget for the establishment of the school.⁶³ Lovink's Minister of Internal Affairs did not have to defend the investment, but he did have to explain why the school had to be located in Leeuwarden. He explained: 'The factory directors gather on a weekly basis in Leeuwarden, the butter inspections take place there, physics and bacteriology are taught there, and the centre of the whole Friesland dairy movement is there'.⁶⁴ This time, however, the Minister was overruled by Parliament.

59 Archival depot of the Ministry of Economic Affairs, Deventer, non-inventoried archive of the Friesian Dairy School, general meeting of the association, 23 December 1899.

60 NA, Archive Ministry of Agriculture, dept. of Agricultural Education (inventory no. 2.11.35, further AMAdAE), dossier no. 365, Letter from the Friesian Agricultural Society to the Minister of Internal Affairs, 5 October 1900; Idem, Letter from Th. Van Welderen Rengers, Van Konijnenburg, Veeman and others to the Minister of Internal Affairs, 17 January 1900. Rengers and Veeman signed as members of the Dairy School Association, but were also influential in the Union of Cooperative Dairy Factories.

61 NA, AMAdAE, dossier no. 365, Commissioner of the King to Minister of Internal Affairs, 17 May 1900.

62 Biographical Dictionary of the Netherlands, lemma Lovink, <http://resources.huygens.knaw.nl/bwn1880-2000/lemmata/bwn2/lovink> accessed 7 July 2015.

63 *Proceedings of the States General* (from now *PSG*) 1900–1901, Appendix A, 2. V. 14, 49–50.

64 *PSG* 1900–1901, 35th meeting on 13 December 1900, 705.

Abraham Bouman, Member of Parliament for the district of Harlingen (to which Bolsward belonged), proposed an amendment on 13 December 1900, as the great majority of the assembly wanted the school to remain in Bolsward.⁶⁵ As the Minister of Internal Affairs and his civil servants clung to their preference for Leeuwarden, a second amendment for Bolsward was submitted. Jan Schokking, a clergyman in a village near Bolsward and Bouman's successor as MP for Harlingen, continued the parliamentary battle for Bolsward. His amendment of 24 December 1902 was again accepted by a majority.⁶⁶ The Minister of Internal Affairs then declared that he would implement the amendment. Bouman and Schokking were motivated by the local interests of Bolsward and the west of Friesland, but there was also a more ideological reason for their amendments. Driven by the cooperative movement, Leeuwarden was becoming the capital of the Friesian dairy cluster. This provoked opposition, instigated by concerns about the balance of power. This balance was partly geographical, since the other cities of Friesland were irritated by the fact that Leeuwarden was accruing increasingly many facilities to itself.⁶⁷ Another part of the concern resulted from the feeling that cooperatives had become too powerful, which could harm individual entrepreneurs and the 'private' companies. Therefore, even after the reorganisation of the dairy school was almost complete, the Friesian dairy cluster was not freed from internal tensions.

Construction of the school nevertheless started in Bolsward and on 1 October 1904 the second dairy school opened its doors to ten students. Before embarking on their courses, which lasted for eighteen months, they were carefully selected through an admissions procedure. Eight were examined in March 1906 and received certificates afterwards. They successfully followed the curriculum which had been so carefully prepared in the preceding twenty years. One year later it was reported that two of them had become directors of dairy factories and six of them assistant directors.⁶⁸ The long-discussed theoretical education for the dairy industry had achieved its aim. Meanwhile, the Union of Cooperative Dairy Factories started its own on-the-job training. It lasted for a period before the cooperative leaders in Leeuwarden resigned themselves to the political decision. But the debate about the school's natural location lasted throughout

65 Idem.

66 O. Santema and K. de Vries, 'De eenmansfractie Schokking in de Tweede Kamer tijdens het ministerie Kuyper (1901–1905)', *Christelijk Historisch Tijdschrift* 5 (1967) 9–17.

67 *PSG* 1900–1901, 35th meeting on 13 December 1900, 703.

68 Department of Agriculture, Industry and Trade, *Verslag over het landbouwonderwijs over 1904/1906* (The Hague 1907), 54.

the entire twentieth century. Only in the late twentieth century did it succumb to the centralization of powers within the Friesian cluster. It lost its independence and merged with a larger organisation in Leeuwarden, which is today called the Van Hall Larenstein University of Applied Sciences.⁶⁹

Table 2. List of examined courses (1906)

No	Course
1	Dairy preparation
2	Bacteriology
3	Chemistry
4	Physics
5	Mathematics
6	Nutrition and Health
7	Accounting
8	Dutch trade correspondence
9	French trade correspondence
10	German trade correspondence
11	English trade correspondence

Source: Students book, archive of Friesian Dairy School

7 Conclusion

The foundation of the first dairy school was a collective strategy of the Friesian Agricultural Society, the province of Friesland and the national state, intended to keep pace with competitors from neighbouring countries and regions. The foundation and failure of this first school were part of a learning process. Various tasks and responsibilities for achieving collective goals such as the improvement of the dairy *industry*, became clearer due to the disappointments experienced through the school's failure. Economic actors became used to a knowledge institution being an autonomous organisation responsible for educating people over a considerable period. At the same time, people involved in the dairy system expected the state to finance the school and control its direction. The same is true of politicians and agricultural policymakers, for history had shown that quality and continuity were at risk if direction was left in private hands. These lessons

69 R. Plantinga, 'Een opleiding van formaat. Een beeldverhaal over de Bolswarder zuivelschool (ca. 1880-1996) *De Vrije Fries* 96 (2016) forthcoming.

were implemented in the second dairy school, which opened in 1904 and became the central location for the education of managers and directors of the Friesian dairy industry throughout the twentieth century.

The way connections between economic actors and the state were built was a whimsical process. As such, it underscores the necessity of unique narratives on singular cases. We can identify a more general mechanism also relevant to the debate on cluster development. During the experimental phases, people from various sectors reshaped their expectations of each other. Due to these fundamental discussions over how to proceed, patterns of cooperation between the business domain, the state and knowledge institutions became more clear. The inevitable frictions helped define each party's role. It is in these exploratory and tentative phases that differentiation of tasks becomes settled, based on everyone's new role expectations. The Friesian dairy school makes clear how such role expectations are produced during a dynamic process of trial and error. Moreover, this case-study showed the importance of a multi-level perspective in the study of cluster evolution. Bottom-up initiatives became fully profitable only after the State developed a framework in which the dairy school was embedded. The logical connection to this national framework provided the financial and organisational support from the Government, thus securing continuity and a standing reputation of the school.

We would also expect to find such learning processes and multi-scalar interactions in other clusters (including in agribusiness) where economic actors and the state have sought to establish knowledge infrastructures to help regional networks adapt to changing circumstances. Identifying and comparing these experimental stages may not only enhance our understanding of cluster development but also stimulate new research into how entrenched knowledge institutions are in regional networks of economic actors and the state.

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