Cattle identification systems and their impact on livestock industry in Thailand

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Introduction

The identification system developed in Thailand is mostly concerning cattle. The cattle identification system has been used for at least 48 years in the country, associated with the artificial insemination system. The first cow conceived with artificial insemination was in September 1956. (Sukhato, 1996). Since then, a system has been in place which has allowed to trace back the origin of the dairy cows in the system. For beef cattle and buffalo, this system can also be used but with some modifications. From that origin, the system has been developed from a manual to computer database system.

Due to the fact that there is no single organisation for animal identification system there are more than one database used by several authorities. In this report, the discussion will be based on the details of the identification systems, pros and cons and their impacts on cattle industry in general.

Livestock statistics

Numbers of livestock in Thailand for the last 10 years are shown in the Table 1. Since 1993, the number of animals tend to decline, except for goats, ducks and chickens. This trend is following the fact that chicken exporting industry is growing every year. The number of goats and ducks did not change dramatically. The decline of the number of other livestock in general might result from a significant number of people moving to work in the industry, for example: electronics, or other hi-tech industries. The number of cattle is the sum of dairy and beef cattle. This figure also decreases by about 1.5 million cattle in 10 years' time.

The number of livestock farms was almost 2 million in the year 2003 (Table 2). When compared to the overall country total (Thai Census 2004: *www.mahadthai.com)* at about 18 million, the families in livestock business are almost 11%. Furthermore, in 2002 Thailand exported livestock products for a total value of more than US$ 1 billion (Livestock Production Export Statistic, 2002: *www.dld.go.th)*. This means that people working in this sector are very significant to the country's economic system.

Table 1. Livestock statistic (by animal types) from year 1993 – 2001 (Livestock Statistic, www.dld.go.th).

	Animals								
Year	Elephant	Horse	Cattle	Buffalo	Swine	Goat	Sheep	Duck	Chicken
1993	2 665	18 047	7 472 573	4 804 146	8 569 126	151 860	110 465	21 778 395	138 832 027
1994	2 502	14 032	7 637 350	4 224 791	8 479 400	141 076	90 508	21 811 815	129 997 098
1995	2 692	16 875	7 609 068	3 710 061	8 561 921	132 400	75 329	18 896 635	111 648 510
1996	3 514	12 003	6 225 221	2 711 737	8 707 887	118 829	40 900	21 400 375	144 579 428
1997	2 180	14 672	5 594 808	2 293 938	10 139 040	125 262	41 926	21 829 896	164 685 842
1998	2 118	11 322	4 863 373	1 951 068	8 772 275	130 904	40 404	19 748 077	155 324 646
1999	2 568	7 350	4 918 396	1 799 606	7 423 101	132 845	39 485	22 330 123	169 632 507
2000	2 172	8 596	5 208 541	1 702 223	7 761 056	144 227	37 312	27 884 041	189 341 110
2001	2 681	8 039	5 571 283	1 710 095	8 203 270	188 497	42 720	28 448 399	214 979 081
2002	2 563	8 103	5 908 625	1 617 358	6 989 152	177 944	39 326	25 034 011	228 760 326

Table 2. Livestock and Farmer Statistics of the year 2003 (Statistic at 1st Jan 2003) (Livestock Statistic, www.dld.go.th).

Type of Animal	Number	Number of farmer (by family)
Dairy Cattle	380 203	20 101
Beef Cattle	5 916 323	993 688
Buffalo	1 632 706	461 152
Swine	7 815 534	317 564
Goat	213 917	23 894
Sheep	42 883	5 538
Elephant	2 839	1 303
Horse	7 137	2 007
Deer	5 810	118
Camel	33	11
Total number of farmer family	1 825 376	

Identification system

Department of Livestock Development's cattle identification system (DLD)

Dairy cattle

The system used by the Department of Livestock Development (DLD) is mainly based on dairy cattle. At present, it is working on a computer database system. The system starts with farm registration, which consist of 4 digits as a running number. When combined with the other two codes of 'province' and 'amphur' or district code (using standard code from "Communication Authority of Thailand: CAT") another four digits are used as a prefix (Table 3). The province ID code consists of two digits, the first is for the region code as in Table 4 and the second one is for the running number of the province in that livestock region. The number of provinces will never go beyond 9.

For cattle registration, the numbering system consist of 8 digits as follows.

$$X_1\ X_2\ Y_1\ Y_2\ ZZZZ$$

- The first digit (X_1) is the Livestock Region ID code (as in Table 4).
- The second digit (X_2) is the Province code of that region (as in Table 3, all provinces in that table are from region 1).

Table 3. Sample of Province and Amphur ID of Livestock Region 1 (Buaban and Poopetch, 1994).

Province ID	Province Name	Amphur ID	Amphur ID
0	Bangkok	01	Pranakorn
1	Samut Prakarn	01	Maung Samut Prakarn
2	Nonthaburi	01	Maung Nonthaburi
3	Pathumthanee	01	Maung Pathumthanee
4	Ayuthaya	01	Phranakorn Sriayuthaya

- The third and fourth digit (Y_1 and Y_2) refer to the year in Buddhist Era (B.E.) by using only the last two digits of that year: i.e. 2547 B.E. will be 47.
- The last four digits (ZZZZ) refer to the number of a calf born in that province in the year concerned.

For example, a calf which was born 599th in the Ayuthaya province in the year (2547 B.E.) would have an ID of '14470599'. This system assumes that there will be no more than 9 999 new born calves in any province annually. The new born calf will be ear tagged using brass ear tag and recorded in a system as a member of a dairy farm.

Beef cattle

The beef cattle identification system is similar to that of dairy cattle. However, the first digit will not be a number, it is replaced by an alphabetic code as in the second column of table 4: i.e. region 1 will be A. So, if a beef cattle calf was born as 2 990 in the Pathumthanee province this year, would have a number of 'A3472990'.

However, since the total number of beef cattle is so high, there would be more than 9 999 calves born in a province annually. So, the running number is allowed to go beyond 9 999 limits by using both sides of brass ear tag. The first 5 digits will be on one side and another 4 will be on the other side. Nevertheless, beef cattle registration is used in a limited scale because there is a huge number of beef cattle compared to the number of people working in the DLD office.

Bureau of Disease Control and Veterinary Services (BDCV) System

The main purpose for animal ID system of the Bureau of Disease Control and Veterinary Services (BDCV) is the tracking of animal movement. Due to the fact that this bureau is in charge of veterinary disease control, they will use their own system. The registration begins when an owner of an animal informs an officer that he will want to move his livestock.

Table 4. Livestock region code (9 regions in total).

Region ID		Artificial Insermination and Biotechnology Research Center Name	Country Region
Dairy	Beef		
1	A	Saraburi	Central
2	B	Chonburi	East
3	C	Nakorn Ratchasima	Northeast (Lower part)
4	D	Khorn Khen	Northeast (Higher part)
5	E	Chiengmai	North
6	F	Pitsanulok	Central North
7	G	Ratchaburi	Central West
8	H	Surat Thanee	South (Higher part)
9	I	Songkla	South (Lower part)

According to the law, the authority must issue a document which will show the details of the animal: type, number, origin and destination including the veterinary record. An ID system must be always utilized. However, there are two type of animals: one already has an ID and the other is without any.

The bureau will use any IDs which existed on an animal to identify it. If there is no ID, the office will use hot branding directly on the animal body. The system is working in this way to trace all animals legally.

Division of Animal Husbandry System

The main objective of the Animal Husbandry Division is livestock breeding improvement. Their system is mainly used internally. The identification system consists of 8 characters formed by 5 digits on the left and 3 alphabets on the right (Vitoonpong *et al.*, 2002), as follows:

XX YYY ZZZ

- First 2 digits (XX) on the left refer to the year in B.E. and the other 3 (YYY) refer to the running number of the animal, born in a particular farm in that year.
- The last 3 characters (ZZZ) refer to the farm or office that is registered in the system.

For example, if an animal has ID of '43008TAK' means that this animal was born in the year 2543 B.E. in the eighth order of TAK farm.

This system has been applied to all livestock species including, cattle, pig, sheep, goat etc. excluding poultry.

Poultry breeder

The ID system for poultry is reserved only to registered breeders. The system consists of 5 characters as follows:

AA YYY

- The first two (AA) refer to the name of the farm in English alphabet and the last 3 (YYY) is a running number of a bird born on a farm that year. For example, 'KB850' will be the number ID of the breeder bird which was born as number 850 in the farm KB in that particular year.

This system is used only for one year and a new re-run is done every year. The record books are changed every year and must be separate for any particular type of poultry. This system is appropriate only for control of a small amount of birds within confined space.

Dairy Farming Promotion Organization of Thailand (DPO) System

The Dairy Farming Promotion Organization (DPO) is the other official organization directly involved in dairy cattle industry. All activities concerning farmer and dairy cattle are similar to that of Department of Livestock Development (DLD).

The ID system of dairy cattle is comparable to that of BBLP, DLD. However, due to the fact that the area of promotion is limited, the ID system is based only on the area of origin of the cow. Thus, the system code is somewhat different from DLD system as reported in Table 5, comprising 2 alphabets in English and 6 digits which indicate year and running number:

AA YY XXXX

- The first two characters (AA) are the code for the service area issued by DPO (Table 5).
- The following 2 digits (YY) are from the year in Buddhist Era (B.E.) by using only the last two digit of that year: i.e. 2547 B.E. will be 47.
- The last four digits (XXXX) refer to the cronological number of cow born in that service area and year.

For example, a cow with ID number 'ML422315' is a cow born as number 2 315 of the year 2542 B.E. in service area called 'Muak Lak'.

There are some more codes which are not mentioned here. For example, breed code i.e.; HF = Holstein Friesian, is the code used internally for database system reference to breeding program. This code will not be on animal ID.

As mentioned above, the ID systems that may be suitable to be used and compared nationwide are the ones of BBLP, DLD and DPO. The other two systems from BDCV and Division of Animal Husbandry are not suitable for extensive use. .

Table 5. Sample of area code used by DPO.

DPO center / Dairy co-op names	Code
Muak Lak	ML
Parkchong	PC
Patananikom	PK
Subkradan	SD
Praphuthabaht	PB
Nongmuang	NM

Comparison between the systems

The identification systems of BBLP and DPO have their own strengths and weaknesses. Table 6 summarises the pros and cons of these two systems.

Both systems can be used nationwide, because the regional code is unique. However, DPO ID system uses only 2 alphabets for a short name of its own promotion area. When out from the particular area, obviously the short name will no longer be unique. Thus, this system needs to be modified to be used nationwide. The BBLP ID system is using Livestock region and province ID which results in less code needed as it covers a larger area. Both systems use a unique ID, so they are definitely suitable for a computer database system.

These two systems designed to be used mainly for cattle have two weaknesses. Firstly, they would not be suitable for very large number of animals as they are limited to a maximum of 9 999 animals born in the same area, annually. If the population is expanding, more digits need to be added. Secondly, if they would be applied to any other type of livestock, the ID would not be unique, because, there is no code designed for species indication.

In both ID systems animals are permanently tagged and a positive identification can be obtained easily.

In general, both systems are almost identically designed to serve breeding plans for each department and results are equally satisfactory.

Impact of cattle identification system

Since the systems mentioned above are designed mainly for breeding planning and animal disease control, these topics should be discussed in depth.

Table 6. Comparison between BBLP ID and DPO ID System.

Topic	BBLP ID System	DPO ID System
Nationwide Deployment	Yes	Yes, with some modification
Suitable for Computer Database System	Yes	Yes
Species Applicable	Cattle only	Cattle only
Large Population Applicable	Yes, with some modification	Yes, with some modification
Positive Identity	Yes, (Ear Tags)	Yes, (Ear Tags)
User Friendly	Yes, after trained	Yes, after trained
Expandable	Yes	Yes, with some limitation

Genetic improvement

A successful breeding program needs many factors. One of these factors is a unique ID for all animals in a breeding plan. Researchers need these ID to follow activities concerning a particular animal. Artificial insemination data, milk records, nutritional data, etc are all based directly on one single animal. At present, there are more than 507 000 dairy cattle registered in the database system for approximately 30 000 registered dairy farms. After almost half a decade of using AI techniques to improve dairy cattle performance, there have been a significant number of reports indicating a successful improvement of dairy herds and beef cattle.

Sanpote and Buaban (2003) reported a genetic trend of milking performance of 6 357 pedigree cows recorded between 1990 and 2002 in Thailand. They found that genetic improvement of milk production was 23 kg per year or about 0.6% in terms of 305-day milk, fat and protein yields. They also reported an increase of phenotypic milk production of approximately 99.08 kg per year or 2.71%. The phenotypic trend of fat and protein yield, also followed the same trend. Buaban *et al.* (2003) studied the genetic transmitting ability of dairy sires of different origin under Thai conditions. They found that sires from Japan gave the highest average breeding value of 305-day milk yield, followed by sires from United State and Canada ($p<0.01$). the sires originating from Thailand including crossbred and purebred and sires originating from Australia, Italy and UK were not significantly different in terms of 305-day milk yield. These are only some examples of genetic impact resulting from deployment of dairy cattle ID system in this country. There are also some progeny projects running under the Division of Animal Husbandry, DLD and DPO. The DPO is also carrying out progeny tests by using its own bulls. The Animal Husbandry Division is doing a series of researches on development of a Thai-Friesian breed.

Veterinary disease control

Animal disease control is another area that may benefit from using active ID system. The surveillance of veterinary deceases needs the system that can control the movement of animals whether international or domestic. Table 7 shows the statistics of animals dead from epidemic diseases in Thailand in the past 10 year. By knowing the animal origin, we can trace back to the point of origin of the disease. For example, the recent outbreak of Avian Flu which affected significantly the country economic system. One important weakness in Thai disease control system is the lack of ID for poultry, even in commercial flocks.

At present, DLD is working on a very important project which is called 'Origin Traceability of Livestock Products Program'. The project is an effort to combine every ID system in livestock industry to one organisation. The objective is to create an ability to trace back to the origin of any livestock product from farm to consumer. The effect will not only be beneficial on disease control, but also yield healthy food products for consumer.

Table 7. Statistic of the number of animal dead from epidemic diseases in Thailand (Livestock Statistic, www.dld.go.th).

Year	Cattle	Buffalo	Swine
1993	48	12	9
1994	444	38	81
1995	106	72	74
1996	56	166	1 147
1997	87	12	819
1998	33	9	2 557
1999	7	2	4 806
2000	59	99	1 547
2001	375	611	4 630
2002	304	28	884

Conclusion

Although, Thailand has deployed many ID systems for livestock, none of them was considered as a national standard. In the near future, DLD will migrate to the new computer database system. This system has been developed for over 3 years by National Electronic and Computer Technology Center (NECTEC), which includes all features concerning dairy cattle and will be used nationwide. It will not be smooth to switch from one system to another one since the revision of a database system needs a large sum of money and is time consuming. We still need a significant effort to deploy effective ID system for livestock in general.

To organize a national livestock ID system is necessary more effort and direct support from the government. With more than 10 years experience in this field, the author suggests that a national organization responsible for these ID systems is needed. It should have all the powers and resources

to brings all current ID systems to one single system. It might be possible to start with one system that is already used nationwide and could be accepted as 'de-facto standard', such as cattle ID system from both DLD and DPO. This could also make the country stronger on any trade conflict arising from the world free trade marketing system. Some supervision from an international organization like ICAR is needed to design the system to perform as expected in the global context.

References

Buaban, S & Poopetch, K. 1994. A.I. Data Recording, A.I. Division, Department of Livestock Development, pp. 58.

Buaban, S., Pongpeng, P., & Virojwuthikul, S. 2003. Genetic Transmitting Ability of Dairy Sires from Different Country of Origin under Thai Conditions, Abstracts of The Dairy Conference on Quality Milk to Consumers, Khon Khen University, Khon Khen, Thailand., 52-53.

Na-Chiengmai, A. & Suwanamajo, S. 2002. Progress Report of Genetic Improvement of Beef Cattle and Buffalo. In Beef Cattle and Buffalo Sire Summary 2002, pp. 85

Samport, J & Buaban, S. 2003. A Genetic Evaluation of Production Traits for Dairy Cattle in Thailand. Thai J of Vet Med., 33: 79-90.

Sukhato, P. 1996. 40 Years of Work With Artificial Insemination, DLD. AI Bulletin (40th Aniversary Edition) Thai Population Census Statistics, KHONTHAI.COM, Ministry of Interior; www.mahadthai.com

Thailand Livestock Annual Statistics, Department of Livestock Development; *www.dld.go.th.*

Vitoonpong, E., Intarathan, W. & Na-Chiengmai, A. 2002. Database of Beef Cattle of Department of Livestock Development. Scientific Paper Number: 45(3)-046-146.