

Breeding Objectives in Different Countries

For many years, most Holstein breeding schemes worldwide focused exclusively on increasing milk production. Selection emphasis for production was initially placed solely on increasing milk yield, and a trend towards selection for increased protein yield followed. Outside North America, several countries put selection importance on fat and protein content, in addition to selection for yield. This exclusive focus on production was exercised in most countries, with the exception of Scandinavian countries, which selected for improved health and reproduction, and North America and Italy, which selected for functional conformation in addition to increased production.

In recent years, there has been a growing interest in broadening selection objectives to include functional traits such as fertility and health to complement selection for production. These changes in selection objectives were meant to reflect constraints in the quota and/or milk pricing system as well as increasing concerns associated with the deterioration of health and fertility of dairy cows. A study recently conducted at Canadian Dairy Network (CDN) compared national selection indexes currently used in various countries. The total breeding goal was divided into three components; Production, which included selection for milk, fat and protein yield as well as for fat and protein percentages; Durability, which included selection for longevity, mammary system, feet and legs, body traits, live weight and temperament; and Health & Reproduction, which included selection for somatic cell score, udder health, milking speed, female fertility and calving ease.

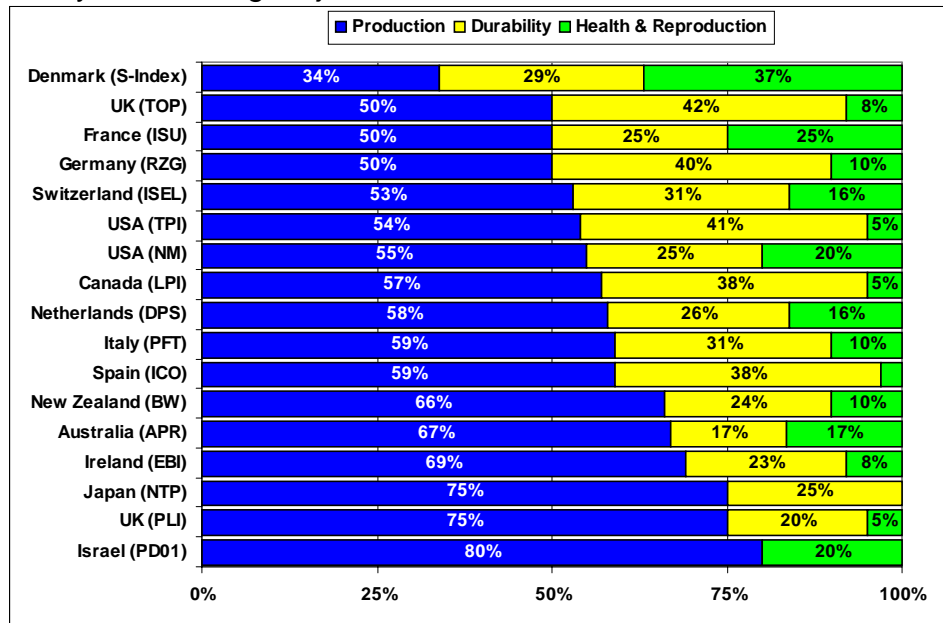
Emphasis on Production

Figure 1 shows the relative emphasis for each component in each country, with the UK and USA providing information for two national selection indexes. Countries are ordered from lowest to highest weight on Production. Average relative weight for Production, Durability and Health & Reproduction across these national indexes, was 59%, 28% and 13%, respectively.

Selection weight on Production ranges from 34% in Denmark to 80% in Israel. With the exception of Denmark, all countries put at least 50% importance on Production in the total breeding goal. Several differences exist across countries with traits included within the Production component, and these differences are shown in Figure 2. Countries are ordered from lowest to highest weight on protein. All countries select for fat and protein yield, with an average of 63% on protein yield, and 21% on fat yield within the production component. Canada, USA and Japan are the only countries that do not select for fat and protein content. Some countries select for fat and protein percentages (Switzerland, Germany, France and Italy) while others place a negative weight on milk yield (Australia, Netherlands, Denmark, Ireland, New Zealand, Israel, and UK) in order to increase fat and protein content. Spain is the only country that positively selects for both milk yield and protein percentage. Canada and Japan select heavily for protein yield, while Switzerland puts the lowest importance on protein yield within the production

component. Canada places 75% emphasis on protein yield within the production component, which translates to 43% of the overall Lifetime Profit Index (LPI).

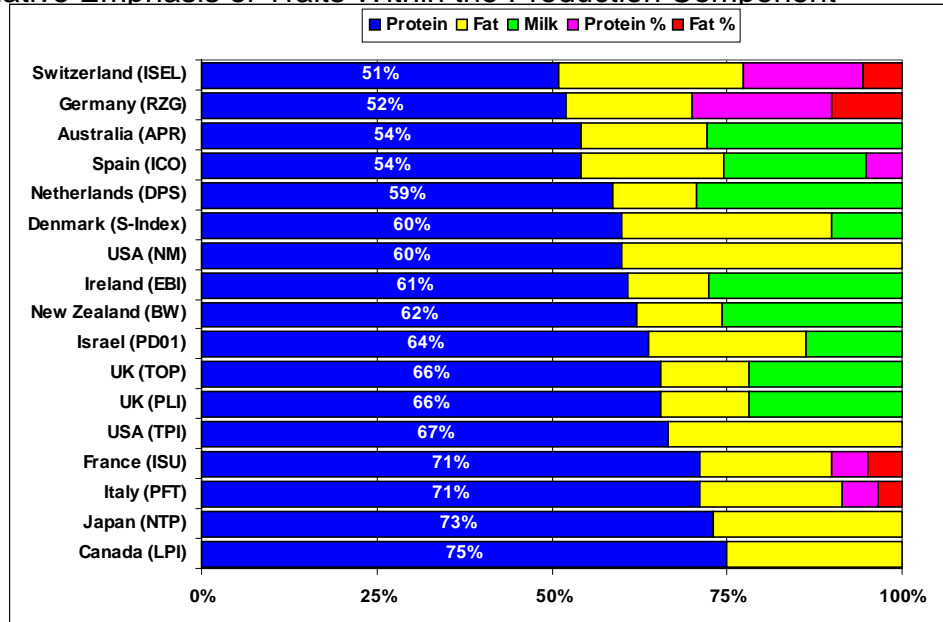
Figure 1: Summary of Breeding Objectives in Different Countries



Emphasis on Durability and Health & Reproduction

Selection weight on Durability ranges from 42% in the UK (TOP) to zero percent in Israel (Figure 1). Germany, USA (TPI), Canada and Spain put a large emphasis on Durability, whereas Australia and UK (PLI) place a relatively low emphasis on selection for a more functional dairy cow that survives longer in the herd. Israel and Japan are the only countries that do not include selection for longevity in their breeding goal.

Figure 2: Relative Emphasis of Traits Within the Production Component



Denmark puts heavy importance on Health & Reproduction (37%), which is three times more than the average country. Japan does not select for Health & Reproduction and Spain places a very small weight on this component (3%). Health & Reproduction mainly focuses on selection for somatic cell score (SCS) and female fertility. Ireland, Japan and New Zealand do not select for SCS. Selection weight for female fertility ranges from zero in some countries (Canada, Spain, UK, Italy, Japan and USA (TPI)) to a high of 12.5% in France. Countries that select for female fertility place on average 8% emphasis on this trait in the total breeding goal. Overall, Denmark places close to equal emphasis on all three components.

In the Past ...

Ten years ago, a similar survey was conducted. At that time, six countries (New Zealand, Israel, UK, France and Germany) put 100% importance on Production. Canada, USA (TPI) and Italy selected heavily for Production and moderately for Durability. USA (NM) also included a small weight for Health & Reproduction. In short, until recently, most countries were selecting solely for production, while North America and Italy placed some emphasis on type traits correlated to longevity. The only country that has not changed their index significantly over those years was Denmark, with their index in 1994 including 30% on Production, 42% on Durability and 28% on Health & Reproduction.

Summary

Selection goals have evolved worldwide, shifting focus on production to a more balanced selection goal of improving production, especially protein yield and percentage, as well as longevity, udder health, functional conformation and fertility. Canada plans to publish female fertility proofs for bulls starting in August 2004 and CDN will be evaluating several options to include female fertility in the LPI starting February 2005. The current comparison of breeding goals in other countries will aid in that discussion.

The cooperation of national genetic evaluation centres and breed associations that provided information and data is kindly acknowledged. Written by Dr. Bethany Muir at CDN based on research by Dr. Filippo Miglior, AAFC and CDN.