Sequencing the Pig Genome

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Summary and Implications

Efforts are underway to sequence the pig genome. Such efforts include raising nearly $40 million dollars to fund the initial sequence map. The sequencing is supported by an international team of scientists and funding to date has been provided by a number of countries, universities, and industry groups including the Iowa Pork Producers Association, the National Pork Board and Iowa State University. Once the pig genome sequence is obtained it is expected that it will have a significant impact on both agriculture and human health.

Introduction

Recent completion of the human genome sequence (the complete genetic code) provides the starting point for understanding the genetic complexity of humans and how genetic variation contributes to diverse traits and disease. It is clear that in addition to humans, model animals such as the pig, can and have played an invaluable role in the understanding of these genetic differences among humans. To accomplish this additional species must be sequenced to resolve the genetic complexity of human evolution and to effectively understand genetic information from comparative (veterinary) medicine to human medicine. Certainly the pig has been a valuable biomedical model organism and its role will expand in the future. The pig also represents an evolutionary branch distinct from primates or rodents, and thus, provides considerable power in the analysis of human genomic sequences.

The pig is a domesticated mammal that has co-evolved with humans and represents a number of diverse selected phenotypes. Consumption of pork continues to grow worldwide and pork represents 43% of all red meat eaten in the world. Given its importance in modern animal agriculture, obtaining the complete genome sequence of the pig is imperative. Such scientific information will lead to improved performance and production, decreased problems with porcine diseases and reduced environmental and welfare concerns.

The pig is not the only animal being considered for sequencing in the next 3-5 years. A total of $50 million dollars was recently pledged to sequence the cattle genome and sequencing of the dog genome is underway. The genome of the chicken, also a species of considerable agriculture and biomedical importance, is nearly completed. Given that these species are either being sequenced or will be sequenced soon, makes the need to sequence the pig ever more important. The National Institutes of Health recognizes this need and had listed the pig as a high priority for genome sequencing but this priority was dropped to moderate priority until significant funding is pledged. To start sequencing the pig genome a total of nearly $40 million dollars is needed and efforts to secure funding for a consortium are already underway.

Iowa's need to maintain its competitive advantage

The state of Iowa produces nearly 25% of all the pigs raised in the US and this agricultural enterprise and allied industries amount to $12 billion dollars of economic activity and 86,000 jobs in the state of Iowa. Any scientific breakthroughs that are possible must be taken advantage of by Iowa pig producers and their allied industry partners. Iowa State University (ISU) has long been a leader in the area of swine genetics and continues to lead in the areas of pig molecular genetics. ISU researchers are presently attempting to unlock the genetic secrets associated with reduced feed intake and waste output, improved growth, improved meat quality and increased leanness. Present research in the area of disease resistance especially needs the genome sequence and this will especially benefit ISU researchers and Iowa producers. Biomedical research at the University of Iowa (UI) is also cutting edge and often the pig is used as a biomedical model. Early acquiring of the genomic sequence of the pig will allow ISU and UI researchers to continue to be competitive at receiving federal grants and making new discoveries. This is especially true since competitive labs in the US will likely participate in the consortium as will competitive labs worldwide.

Funding plan

A number of international leaders from the pig genetics community met in France in September 2003 and discussed developing a consortium to find funding and share in the information prior to its public disclosure. Some preliminary sequencing efforts have been funded and pledges to release this information to the consortium have been given. Participants in the project include China, Denmark, France, Korea, UK, and the US. The University of Illinois, Iowa State University and North Carolina State University have also pledge support.

Iowa State University has committed a total of $200,000 to this effort and the Iowa Pork Producers Association has committed $100,000. This combined effort of $300,000 has been very useful in getting a commitment of $750,000 from the National Pork Board and in trying to get a $12-15 million commitment from the USDA. Such a commitment will likely then be used to receive a commitment from the Sanger Institute in the UK.

Future developments

Over the next year funding efforts will hopefully be completed with sufficient funds to move the sequencing ahead. It is hoped that a draft sequence, ready for use by scientists will be ready by the summer of 2006.

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