

A SUPPLY-SIDE APPROACH TO OCCUPATIONAL FEMINIZATION:
VETERINARY MEDICINE IN THE UNITED STATES, 1976-1995

By

ANNE E. LINCOLN

A dissertation submitted in partial fulfillment of
the requirements for the degree of

DOCTOR OF PHILOSOPHY

WASHINGTON STATE UNIVERSITY
Department of Sociology

MAY 2004

To the Faculty of Washington State University:

The members of the Committee appointed to examine the dissertation of
ANNE E. LINCOLN find it satisfactory and recommend that it be accepted.

Chair

A SUPPLY-SIDE APPROACH TO OCCUPATIONAL FEMINIZATION:
VETERINARY MEDICINE IN THE UNITED STATES, 1976-1995

Abstract

by Anne E. Lincoln, Ph.D.
Washington State University
May 2004

Chair: Michael P. Allen

As women have made unprecedented gains in paid labor since the 1960s, the study of changes in occupational sex composition and its impact upon workers has emerged as one of the most interesting phenomena to labor market researchers. However, this literature has suffered from a number of data limitations. One of the most confining issues has been the inability to determine how many men would have entered an occupation had women not supplanted them. In focusing on one rapidly-feminizing occupation, veterinary medicine, the present research overcomes this limitation by analyzing the sex composition of applicants to all twenty-seven American veterinary medical colleges between 1976 and 1995. Applicants to the programs represent some measure of interest in the profession and thus do not reflect biases by admissions committees or employers. Cross-sectional pooled time-series analyses are used to test twelve hypotheses of the impact of structural and economic factors on male and female applicants. Support of feminization theories is mixed. Net of control variables, the structural variable analysis does not support the theoretical expectation that men shy away from feminizing occupations because of the presence of women. However, the presence of women as veterinary faculty may serve to discourage other women from applying. This finding is unexplained. Tests of economic hypotheses are similarly mixed in their support of feminization theory predictions.

Starting salaries for veterinary graduates are not predictive of the number of male and female applicants a school subsequently receives. However, veterinary salaries relative to the average worker's earnings serves to positively influence applicants. Further, consistent with discourse in the popular and veterinary literatures, the wages of veterinarians *relative to physicians* serve to deter male applicants. Contrary to the discourse, however, the relative wage gap also serves as a disincentive to female veterinary applicants. Thus, support is found for the similarity of application processes for applicants of both sexes. The findings may be suggestive of mechanisms in veterinary medicine in other countries as well as feminizing health professions in the United States.

TABLE OF CONTENTS

	Page
ABSTRACT.....	iii
LIST OF TABLES.....	vii
LIST OF FIGURES.....	viii
CHAPTER	
1. INTRODUCTION.....	1
Statement of the Problem.....	1
Explaining Feminization.....	3
2. THEORETICAL PERSPECTIVES ON OCCUPATIONAL SEX COMPOSITION....	8
Feminization and Sex Segregation.....	8
Explaining the Sex Composition of Labor Markets.....	11
Limitations of Past Research.....	17
The Supply Side of Gatekeeping.....	19
3. FEMINIZATION OF THE HEALTH PROFESSIONS.....	22
The Feminization of Veterinary Medicine.....	27
The Present Research.....	30
Hypotheses.....	34
Female Presence Hypotheses.....	35
Low Wages Hypotheses.....	36
Relative Wages Hypotheses.....	37
4. RESEARCH DESIGN AND METHODOLOGY.....	41
Data.....	41

Dependent Variables.....	43
Independent Variables.....	45
Methods.....	47
5. ANALYSIS AND RESULTS.....	49
Female Presence.....	49
Low Wages.....	51
Relative Wages.....	53
6. DISCUSSION AND CONCLUSIONS.....	60
BIBLIOGRAPHY.....	83
APPENDIX	
A. UNITED STATES VETERINARY MEDICAL COLLEGES.....	92
B. DATA SOURCES.....	94

LIST OF TABLES

1. First-Year Student Enrollment in the Schools of Selected Health Professions, 1970-1999, By Sex.....	70
2. United States Bachelor’s Degree Recipients, By Sex, 1960-2000.....	72
3. Number of Veterinarians in the United States and Percentage in Selected Years, By Sex, 1970-1998.....	73
4. Summary of Independent and Dependent Variables, 1976-1995.....	74
5. Unstandardized Coefficients from the Random Effects Regression of the Number of Male Applicants to United States Veterinary Medical Colleges on Measures of Female Presence, 1976-1995.....	76
6. Unstandardized Coefficients from the Random Effects Regression of the Number of Female Applicants to United States Veterinary Medical Colleges on Measures of Female Presence, 1976-1995.....	77
7. Unstandardized Coefficients from the Random Effects Regression of the Number of Male Applicants to United States Veterinary Medical Colleges on Measures of Low Wages, 1976-1995.....	78
8. Unstandardized Coefficients from the Random Effects Regression of the Number of Female Applicants to United States Veterinary Medical Colleges on Measures of Low Wages, 1976-1995.....	79
9. Unstandardized Coefficients from the Random Effects Regression of the Number of Male Applicants to United States Veterinary Medical Colleges on Measures of Relative Wages, 1976-1995.....	80
10. Unstandardized Coefficients from the Random Effects Regression of the Number of Female Applicants to United States Veterinary Medical Colleges on Measures of Relative Wages, 1976-1995.....	81
11. Correlation Coefficients and Basic Statistics for Variables Used, 1976-1995.....	82

LIST OF FIGURES

1. Applicants to United States Medical Colleges, By Sex, 1970-1999.....	65
2. Applicants to United States Veterinary Medical Colleges By Sex, 1976-1999.....	66
3. Graduates from United States Veterinary Medical Colleges By Sex.....	67
4. First-Year Cohort Enrollment in United States Veterinary Medical Colleges By Sex.....	68
5. Applicants to United States Veterinary Medical Colleges By School and Sex, 1976-1995.....	69

CHAPTER ONE

INTRODUCTION

Statement of the Problem

Over the course of United States history, the vast majority of occupations have been male-dominated due to legal and social limitations on women's labor force participation. Most occupations have historically drawn workers primarily from the heavily male-dominated labor force. However, as a result of the women's movement in the late eighteenth and early nineteenth centuries, educational opportunities expanded for women and they began to work in greater numbers than before. In some instances, women made significant inroads into occupations, even highly prestigious ones. For example, at the turn of the last century, the number of women employed as physicians grew to be 23 percent of the profession in the Boston area. After winning the right to vote in 1920, however, much of women's employment outside the home was again curtailed by law and social convention. Women's employment grew again during World War II, and sharply decreased thereafter (Milkman 1987). More recently, with the advent of the modern women's movement, women have entered into paid employment in the largest numbers ever before in history, a trend that has yet to signal reversal.

Due to the importance of the economic realm in structuring life chances for individuals, studies of the labor market and its outcomes for workers have focused much attention on the processes that sort workers into occupations. One of the primary predictors of the type of employment in which a worker will be engaged is the person's sex. Many occupations are sex-typed, meaning that occupations are strongly associated with male or female incumbents, and sex-segregated, in that the sex composition of the occupation deviates from the sex composition

of the general labor force. Over the course of the last century, the sex composition of many occupations has been generally quite rigid (Beller 1984), though it has lessened since the 1970s. More recently, in the 1990s, sex integration of paid employment has slowed (Jacobs 2001). However, women are concentrated in fewer occupations than men, and female-dominated fields earn much less than those populated more heavily by men. Thus, to labor market researchers, any significant change in an occupation's sex composition is an intriguing puzzle.

Among other things, sociological research has decisively shown that although women have increased their numbers in the workforce since the 1960s, they have not entered all occupations at the same rate. Since 1970, women have moved into some occupations in great numbers, such as real estate sales, while nearly avoiding others altogether, like mechanical engineering (Reskin and Roos 1990). At the extreme, some occupations that were previously male-dominated have "tipped" and become female-dominated, such as in the cases of banking (Rich 1995) and pharmacy (Phipps 1990), among others. More rarely, the gender composition of occupations has changed in the opposite direction, moving from a majority, or significant minority, of women to becoming strongly male-dominated, such as in the case of motion picture screenwriters (Norden 1995). For labor market researchers, explaining the disproportionate representation of women in occupations is paramount.

Neoclassical economics asserts that the labor market functions rationally within relations of exchange. Thus, to neoclassical economists, the fact that men and women are employed primarily in different occupations simply reflects personal tastes or preferences, which are beyond the bounds of economic explanation. These theories do not attempt to test such assumptions. The outcome of the sex-segregated labor market is merely presumed to provide evidence for the choice. In contrast, gender queuing theory has been offered as a compromise

between the considerations of supply-side occupational preferences and demand-side constraints on the part of employers, such as statistical discrimination and personnel practices (Reskin 1993). Research based on this perspective suggests that any combination of factors may result in the change of an occupation's sex composition., including a shortage of male workers, the growth of the occupation, which results in a demand for workers, declining occupational prestige, declining employment security, declining promotion prospects, declining real earnings, deskilling, and male flight from the occupation (Reskin and Roos 1990).

Yet, the foundational tenet of neoclassical economic explanations of occupational sex segregation, and an important part of queuing theory – specifically, workers making themselves available to different occupations – has eluded empirical testing. This is because research on labor markets has been forced to rely upon data regarding entry into the work force at or after the point of employee hire. As a result, labor market studies, and studies of occupational feminization in particular, have been limited by the difficulty inherent in determining how many more men would have entered an occupation if women had not entered.

Explaining Feminization

The concept of feminization has a long history. The term was coined in 1652 to mean “to grow or become feminine” (Oxford English Dictionary 1989). Since the 1920s, the veterinary literature has used the term to describe the characteristics a male animal takes on when castrated. This is suggestive of the sociological debate surrounding what happens when the sex composition of occupations change. Do male-dominated occupations take on new characteristics as women begin to represent a greater proportion of its employees? What leads to women's entry into occupations at different rates, and what characteristics of occupations change when

women enter, if any? Because feminization is a process, requiring years, cause and effect are muddled and can be extremely difficult to disentangle. For example, do status declines in an occupation prompt an exodus of men or does the status of the occupation decline because women move into it? Does occupational remuneration change with increasing representation of women, and if so, does it result from or precipitate male flight?

Unfortunately, many studies of shifting occupational sex composition have lacked much explanatory power. Certainly, sociological research has decisively shown that jobs performed primarily by women tend to pay less, and have lower status, less upward mobility, less flexibility, and higher turnover than jobs dominated by men (e.g. Blau and Beller 1988, Jacobs and Steinberg 1990, Tomaskovic-Devey 1993, England, Herbert, Kilbourne, Reid, and Megdal 1994, England, Thompson and Aman 2001). Yet, much of the research into occupations that have experienced significant changes in sex composition has been forced to employ primarily descriptive statistics. Such research typically plots the changing ratios of men and women in an occupation over the course of years or decades and cites historical turning points, occupational status changes, and earnings ratios that likely influenced the entry of women or resulted in the flight of men. Data limitations have typically precluded much in the way of hypothesis testing (There are exceptions, e.g. Cohn 1985, Wright and Jacobs 1994).

The present research examines occupational feminization through the study of one occupation: veterinary medicine. This field has experienced a dramatic change in sex composition. The field, which was 98 percent male in 1960 (U.S Bureau of the Census 1960), is projected to be evenly split between men and women in 2004 (KPMG Peat Marwick 1999). The study of veterinary medicine provides a unique approach to understanding feminization because to practice legally, veterinarians must complete four years of highly-specialized post-graduate

training at one of only 27 accredited veterinary medical colleges in the United States. With few exceptions (e.g. Phipps 1990), the majority of the feminizing occupations that have been studied have not had these educational requirements. As a result, the very specific educational requirements for veterinarians permit a processual analysis of feminization by tracking the movement of women and men from the point of entry into the veterinary medical colleges.

What led to the significant influx of women into the veterinary colleges? Any number of popular accounts has been proposed. While most of these stories implicitly acknowledge expanded vocational opportunities for women in the 1970s, they typically then reduce to psychologically-based rationalizations. One case in point is the commonly-invoked explanation that veterinary medicine allows women to express the natural, nurturing part of their personalities (Gose 1998). Other factors cited are the invention of new tranquilizers that allowed women to restrain animals as well as men, the allure of the field's tolerance of part-time practice, the introduction by Congress of the Veterinary Medical Act of 1966 (Brown 1987), its status as one of the lowest-paid professions, stagnating salaries in the profession, the increased numbers of women working as a result of the women's movement, and Title IX's forced relaxation of admissions discrimination by the veterinary medical colleges. Most of these proposed explanations have little empirical evidence to substantiate them, and indeed, many of the listed "causes" could as easily be *effects* of women's entry, rather than causes. Additionally, many of these explanations involve counterfactual conditionals and are difficult to examine empirically (Reskin 2003).

Of equal interest to labor market researchers is the decline in the number of men enrolling in veterinary medical colleges. Despite the profession tripling in size between 1960 and 1998, fewer men are becoming veterinarians each year. After decades of consistent growth

in male enrollments, male first-year student enrollment in North American veterinary medical colleges plummeted 55 percent over the course of just a generation, from a high of 1,483 in 1972 to a mere 673 in 1999. This occurred despite the construction of several new colleges of veterinary medicine and increased student cohorts at existing schools. This phenomenon was not limited to the veterinary colleges. Indeed, most of the educational programs for the health professions, including medicine, pharmacy, and dentistry, experienced declines in male enrollment. Thus, determining the factors involved in plunging male enrollment in veterinary medicine may elucidate the mechanisms that lead to occupational sex segregation more generally.

Unique data on the sex composition of applicants to these colleges provide an opportunity to explicate the supply side of the process of feminization in this occupation. The sex composition of the applicant pool is inextricably linked to the sex composition of the veterinary college enrollment. This type of data has not been used before by feminization researchers. These data permit this research to empirically address the causes of the dramatic decrease in the number of male applicants to the programs that occurred after 1976. Between 1976 and 1990, the number of applications from men dropped nearly 83 percent (AAVMC 1995). Most of the decline occurred between 1980 and 1986, dropping from over 4,000 applicants to barely 2,000 per year. The number of male applicants recovered somewhat in the 1990s. The number of applications from women also decreased during this time, but later rebounded. Yet, enrollment during this time period was a mixed picture. The number of men who actually enrolled has consistently declined while female enrollment has continued to increase.

The subsequent chapters present a novel approach to studying the process of feminization from the perspective of applicants to an occupational gatekeeper, veterinary medical colleges. In taking a supply-side approach to the issue of occupational feminization, this research seeks to discern empirically the influences on the applicant pool to the veterinary medical colleges. The research tests three specific hypothesized causes of feminization gleaned from the feminization literature. Data to test these hypotheses are drawn from a variety of sources, including the United States Census (Ruggles *et al.* 1997), the Current Population Survey (King, Ruggles, and Sobek 2003), the American Association of Veterinary Colleges, and the American Veterinary Medical Association. Chapter Two outlines the theoretical approaches of human capital and gender queuing to understanding the sex composition of occupations, focusing on the asserted causes and results of feminization and the limitations of past research. Chapter Three discusses the feminization of the health professions, with a specific focus on historical aspects of the veterinary profession. This chapter also presents the three broad hypotheses of feminization that this research tests. Chapter Four outlines the variables, data sources, and statistical techniques used in the study. Chapter Five presents results from cross-sectional time-series tests of influences on the number of male and female applicants to American veterinary medical colleges. Chapter 6 concludes with a discussion of the broader implications from this study.

CHAPTER TWO

THEORETICAL PERSPECTIVES ON OCCUPATIONAL SEX COMPOSITION

Feminization and Sex Segregation

The terms feminization and sex segregation represent two of the most interesting, and least well understood, interrelated phenomena in recent decades. The concept of feminization crept into the sociology of occupations literature in the 1960s and was used initially to describe the changing sex composition of the teaching profession in Japan (Hara 1962) and Poland (Woskowski 1963). Later, it was used in reference to the influx of women into the medical profession in France (Rocard 1965). It was only three years thereafter that researchers coined the term “sex segregation” when noting the remarkable stability of the process by which workers are sorted into occupations by sex (Gross 1968). The subsequent four decades of research have laid out much groundwork for describing the processes by which the sex composition of occupations changes. However, in part due to data limitations, this understanding is far from complete.

Research into occupational sex composition in the United States has demonstrated that most occupations are sex-segregated, in that the majority of people comprising the occupation are of one sex (Jacobs 1989a).¹ Even seemingly-integrated occupations are segregated into more specific subcategories, jobs, such that men tend to occupy the higher-paying, more desirable positions (e.g. Bielby and Baron 1986). For example, among transportation employees, men tend to fill higher-paid municipal transit jobs, while women predominate as school-bus drivers (Reskin and Roos 1990). Similarly among restaurant servers, women are disproportionately represented in family-style dining while men fill the more lucrative positions in upscale

¹ Racial occupational segregation is also prevalent, but beyond the scope of the present endeavor. Racial composition will be incorporated in subsequent research. For a summary of determinants and consequences of job-level race composition, see Reskin, McBrier, and Kmec (1999).

restaurants (Reskin and Roos 1990, but see Hall 1993). Given the importance of the economic realm for establishing access to opportunities and structuring life outcomes, it is clear that the isolation of women into lower-paying occupations and the less profitable jobs within those occupations has important implications for women's economic status and well-being. Indeed, numerous studies have demonstrated that a varying, but significant, portion of the gender wage gap can be explained by sex segregation in employment (England, Farkas, Dou and Kilbourne 1988, Tomaskovic-Devey 1993, Roos and Gatta 1999, England, Thompson and Aman 2001). However, this gap typically narrows considerably for men and women in the same detailed job category (Tomaskovic-Devey 1993, Petersen and Morgan 1995).

While both concepts involve the sex composition of occupations, sex segregation suggests stability while feminization connotes change. There is no specific consensus in what it means for an occupation to feminize. In some cases, the term merely suggests that the proportion of women in an occupation is growing (Rich 1995). In other cases, for an occupation to be feminizing suggests that the proportion of women in the occupation is increasing faster than the proportion of women in the workforce during the same period (Reskin and Roos 1990). However, the term does not necessarily mean that the occupation is numerically dominated by women, though it can be. In such an instance, the occupation is said to be *resegregating* from being comprised primarily of men to being a female domain (Reskin and Roos 1990). A number of macro-level studies of feminization and resegregation have been conducted (Reskin and Hartmann 1986, Reskin and Roos 1990, Weeden forthcoming). There have also been a series of case studies of feminization and resegregation in human resource management (Roos and Manley 1996), the banking industry (Rich 1995), clerical labor (Rotella 1981, Davies 1982, Cohn 1985), pharmacy (Phipps 1990, Muzzin, Brown, and Hornosty 1994, Tanner and Cockerill

1996, Tanner, Cockerill, Barnsley and Williams 1999), cigar-making (Reskin 1988), law (Menkel-Meadow 1989, Chiu and Leicht 1999), the American Sociological Association elections (Rosenfeld, Cunningham, and Schmidt 1997) and sociology generally (Roos 1997), the clergy (Nesbitt 1997), and school teaching (Strober 1984), among others. More rarely, the sex composition of occupations has changed in the opposite direction, moving from a majority, or significant minority, of women to becoming strongly male-dominated, such as in the case of motion picture screenwriters in the early part of the twentieth century (Norden 1995). However, simply because men have historically comprised more of the workforce, occupations are more likely to feminize and resegregate than become masculinized.

As a result, while the term invokes images of a growing female presence in an occupation, feminization often entails changing numbers or proportions of men as well. As a result, in a male-dominated occupation that is experiencing significant change in its sex composition, a number of patterns are hypothetically possible. In some instances, a shortage of men may promote the recruitment of women, as the automobile and electrical manufacturing industries did during World War II (Milkman 1987). Another possibility is that occupations that are undergoing expansion could retain or increase the number of male workers while adding women, as the health professions did in the 1970s (Phipps 1990). In this case, the number of men could either grow while remaining proportionally constant, or their numerical frequency could remain stable while their proportional representation drops. Furthermore, if men do enter a sex-atypical occupation, superiors may promote them quickly on the assumption that the men prefer or are more suitable for administrative posts (Williams 1992). Of course, any of these situations could be exacerbated by male abandonment of the occupation. Indeed, this is the general finding of Reskin and Roos (1990), whose case studies of occupations that were

feminizing in the 1970s described declining occupational status and their subsequent desertion by men. Male exodus thus prompted, then accelerated, the compositional turnover. However, support is not ubiquitous for the notion of “male flight” (Wright and Jacobs 1994, Coventry 1999).

Once occupations become dominated by one sex, psychological mechanisms may contribute to sex segregation. Most occupations are sex-typed, in that the expected worker for a job is of a specific sex. Thus, workers who differ from the anticipated sex can invoke surprise or distrust on the part of others, such as in the case of patient responses to female physicians (West 1984), although this trend probably wanes as an occupation feminizes. Furthermore, expectations of masculinity and femininity are frequently infused in the identities of specific jobs. As a result, nontraditional workers may have their sexual orientation questioned, as in the cases of male nurses and female marines (Williams 1989) and male clerical workers (Henson and Rogers 2001). In other cases, job descriptions are revised when a sex-atypical worker is employed. For example, when a shortage of men during World War II prompted the hiring of thousands of female automobile and electrical workers, the formerly masculine occupational categories were changed so that the women’s femininity was retained, even highlighted. Tightening screws, likened to squeezing oranges for breakfast, reframed the job as an extension of a woman’s femininity (Milkman 1987). Similar redefinitions have been employed to describe the occupational requirements for veterinarians. The brute strength and larger size of men, formerly emphasized as necessary to control unpredictable livestock, has shifted to the perspective that women are natural for the field due to an innate ability to calm animals. Similarly, women’s smaller size, formerly an unequivocal detriment, has been cited as an asset when turning breech births. Thus, the general arbitrariness of sex-based designations for many

aspects of occupations is brought to light when these justifications change significantly. These changes are of great interest to social scientists because an explanation of the changes in the sex composition of occupations can elucidate the process by which sex-typing occurs. Additionally, a focus on aspects of change may underline aspects of stable occupational sex segregation.

Explaining the Sex Composition of Labor Markets

A number of theories have been formulated to understand the causes of the sex composition of occupations in labor markets. These explanations are typically understood in the context of the economic concepts of “supply” and “demand” with regard to how the supply of qualified workers and demand for their labor interact. Demand-side theories concentrate upon the preferences of employers and the actions they take when making hiring decisions.

Sociologists have tended to focus on structural constraints on workers, such as employer preferences and discrimination, internal labor markets, and the economic pressures of labor costs. In contrast, supply-side explanations of occupational sex composition focus on the occupational choices made by workers.

Human capital theory, a supply-side theory, is typically traced through Becker (1964), who formalized the microeconomic foundations of the theory. The perspective has since been elaborated upon by him (Becker 1981, 1985) and others (Mincer and Polachek 1974). In theorizing the distribution of labor income, this perspective is most frequently used to explain how individuals engage in personal cost-benefit analyses in planning their eventual entry into the labor market. According to the theory, investments in education or on-the-job-training are made in exchange for immediate gratification in paid employment. Human capital theory is applicable to understanding occupational sex segregation as it focuses on how different plans by men and

women for the future result in different investments in human capital (Marini and Brinton 1984, Becker 1985). It is argued that women, much more than men, plan discontinuous employment in order to accommodate childbearing and family responsibilities. As a result, it is asserted, women invest in lower levels of human capital than men and prefer jobs that have higher starting salaries with lower levels of skill stagnation during periods of labor market inactivity.

Human capital explanations of occupational sex segregation are essentially predicated upon the interpretation of an outcome and an assumption. The assumption is that the labor market functions perfectly economically. Based on this supposition, the human capital explanation subsequently provides an ad hoc explanation of the observed differential entry of men and women into specific occupational labor markets. Specifically, these differences are interpreted to be evidence of different preferences of men and women. Thus, such supply-side perspectives on occupational sex composition are framed by the primary assumption of worker agency. Individual “tastes” in terms of employment preferences are assumed to arise from and be explained by events prior to employment. Thus, the assumption is that the distribution of women and men into different occupations reflects personal choices and priorities in the way in which workers make themselves available to different occupations. Neoclassical economists generally do not try to explain or test the origins of these tastes.

Contrary to these tenets, women do not, in fact, start in jobs with higher starting salaries and lower wage and skill depreciation curves (England 1982, 1992). Further, women and men tend to value jobs equally in terms of income and other attributes (England and McCreary 1987). Thus, to sociologists, human capital theory has not been able to explain the differing concentrations of men and women in the same occupation at the detailed occupational level. Human capital theorists suggest that these differences result from unmeasured differences in

human capital, or that women's productivity suffers because of home and child care responsibilities (Becker 1985). However, studies using detailed individual-level data still find unexplained wage disparities between men and women and differential sex compositions across jobs (England, Farkas, Dou and Kilbourne 1988). This is true even of research that introduces controls for worker productivity (Smith 2002).

Sociologists have responded to human capital explanations through the creation of demand-side explanations for sex segregation. Stratification scholars assert that the labor market does not function perfectly and that workers' occupational choices are circumscribed by more than individual choices and tastes. However, sociologists do not negate that workers have preferences concerning their employment. Indeed, in their landmark research on the feminization of occupations, Reskin and Roos (1990:38) explicitly state their assumption that individuals are more familiar with supply-side aspects of employment than with the structural constraints of the demand side. On the supply side, research has demonstrated that workers weigh considerations of income, occupational prestige, autonomy, job security, promotion opportunities, and other factors when considering employment opportunities (Jencks, Perman, and Rainwater 1988). Specific worker preferences may be further influenced by other factors, such as sex-role socialization and the subjective perceptions of what jobs are available (O'Connell, Betz, and Kurth 1989, Reskin 1993, Reskin and McBrier 2000).

To address the issue of worker tastes, while considering structural limitations, Reskin and Roos (1990) present a gender queuing theory to understand and explain how the supply of workers and the demand for their labor interact in the labor market to bring about change in the sex composition of occupations (normally feminization). It is typically one of the most commonly cited theories for explaining how the sex composition of occupations changes.

Generally in queuing theory, two processes are said to be at work for any given occupation. On the demand side of the theory, employers have a model of the most preferable worker for the job in mind and rank order applicants according to that model. Ascribed characteristics, such as sex and race, and achieved characteristics, in the form of human capital, form the basis by which potential employees are ranked (Thurow 1975). Sex is posited to be one of the characteristics by which employers rank workers, in that men or women may be preferred for certain jobs for specific reasons. This may be because employers prefer male workers or it is assumed that customers prefer to interact with men. However, for some jobs, female workers may be preferable to men. This is because employers may be able to pay women less than men for the same work, or women may be perceived as presenting less of a challenge to authority as men (Reskin and Roos 1990).² On the supply side of queuing theory, the second process at work involves the perceptions and preferences of employees. In this part of the process, workers rank occupations and jobs on their attractiveness in terms of wages, prestige, autonomy, and working conditions.

As mentioned above, much sociological research has questioned some of the tenets of existing supply-side explanations and found much disconfirming evidence for this perspective. Thus, most sociological research has been oriented toward structural or demand-side explanations. These studies focus on employers' motives in the allocation of workers to jobs. Put another way, these studies are predicated on the assumption that an employer, making hiring decisions, acts as a gatekeeper to the occupation. This assumption is certainly true of most

² Some demand-side theories focus on the sex or race composition of jobs and occupations or the type of labor performed to explain their low wages relative to other, similar jobs or occupations (England 1992, Tomaskovic-Devey 1993, England, Herbert, Kilbourne, Reid, and Megdal 1994). Jobs and occupations may be economically devalued by employers if they are performed primarily by women, such as the "caring" labor of nursing. These types of theories are not used in this research because the most common employment arrangement for employees of the occupation in this study, veterinary medicine, is that of sole proprietor or partner (AAVMC 1996). Thus, to some extent, veterinarians set their own salaries.

occupations. Indeed, many studies of sex composition have focused on this point because of the availability of the data. Overwhelmingly, the only information available regarding the workforce is collected after a worker is employed.

The human capital and gender queuing theoretical frameworks have been influential for much of the economic and sociological research that seeks to understand the ways in which workers and jobs are matched. Yet, one of the primary tenets on which human capital theory rests – how workers “supply” themselves to employment – has remained immune to empirical scrutiny by neoclassical economists. While assuming tastes to be exogenous to models of sex segregation, human capital theory has made no attempt to test them explicitly. Thus, perhaps the most important consideration in human capital theory is the way in which workers initially make themselves available to be employed. This consideration is of primary importance to occupations that are experiencing a change in sex composition. It is in such occupations that tests of human capital theory should be conducted.

Sociological approaches, such as gender queuing theory, have proposed a number of supply-side explanations that work in conjunction with demand-side outcomes to bring about occupational feminization. Although supply-side factors are inextricably linked with demand-side aspects, a primary sociological explanation of feminization is a scarcity of male workers. While men may certainly flee an occupation, what serves to deter male workers from entering initially? Reskin and Roos' (1990) case studies suggest that declining occupational prestige, declining employment security, declining promotion prospects, declining real earnings, and deskilling prompted men to look elsewhere when making employment choices. These are logical explanations for the feminization of the eleven fields they study. Unfortunately, these hypotheses have heretofore been difficult to test empirically, primarily due to data limitations.

Indeed, there is no hypothesis testing at all in their research. These data limitations are detailed in the next section.

Limitations of Past Research

It is not unexpected that there are serious hindrances with which to contend in approaching an issue as complex as the feminization of an entire occupation in a nation as large as the United States. The most substantive problem centers on the type of data available for analysis. Aggregated Census data on occupations are used in many studies of feminization (Strober 1984, Reskin and Roos 1990, Rich 1995). Yet, even at the detailed occupational level, these data obscure potential differences across industries. For example, human resource managers in hospitals may experience substantially different occupational conditions from such managers in engineering firms (Roos and Manley 1996). In addition, such Census data, frequently used in studies of feminization, are generally only sufficient descriptively and lack robust explanatory power. In part, this limitation results from the decennial nature of the Census, which can obscure trends that happen with a decade. Yet, much research into occupations that have experienced significant changes in sex composition has been forced to center analyses primarily around descriptive statistics. Such research must typically plot the changing ratios of men and women in an occupation over the course of decades and cite historical turning points, occupational status changes, and earnings ratios that likely influenced the entry of women or resulted from the flight of men. Undoubtedly, historical accounts can bolster the certainty of trends. Yet, a comparison of women's rate of entry across occupations is limited in its ability to probe the process of feminization for causal mechanisms.

Triggers of feminization and their causal mechanisms have been hypothesized, but the nature of the data limit explicit hypothesis testing. Assertions that status changes in an occupation or stagnating wages prompt sex turnover are difficult to test, as the cross-sectional nature of much of the research on the sex gap in pay cannot determine whether salaries are affected by the changing sex composition of the occupation (Catanzarite 2003). Indeed, many asserted negative impacts of feminization, such as status changes, declining real earnings, and limited opportunity for promotion, might as easily be a cause as an effect. Research on the “male flight” aspect of feminization has been most successful in conducting hypothesis tests (Wright and Jacobs 1994, Coventry 1999). These studies find no support for the thesis of male flight.

Research on occupational sex changes has suffered the additional constraints of relying upon data regarding entry into the occupation at the point of the employee’s hire. As a result, past studies of feminization have been limited by the difficulty inherent in determining how many more men would have entered an occupation if women had not entered. This is partly due to the fact that most feminizing occupations have not required extensive education or structured training prior to entry, which would allow compositional changes to be tracked earlier in the process. However, even studies of the feminization of pharmacy, which requires specific accredited education, experience, and state licensing, have only been able to hypothesize explanations of the substantial increase in the entry of women to the field (Phipps 1990, Muzzin, Brown, and Hornosty 1994).

To compensate for these limitations, Reskin suggests turning away from individual-level data as such data can only comment on “individual-level inputs and outcomes” (Reskin 2003:16). In the tradition of Baron and Bielby (1980), she proposes that researchers turn to

employer data. She suggests that such data will allow a focal shift to mechanisms of feminization. Given their gatekeeper function for occupations, employers or their equivalent – structured training programs or certification tests – are logical points of study. The present research promotes a new theoretical orientation and application of this proposal.

The Supply Side of Gatekeeping

While sociologists have done much to explain the ‘why’ of ascriptive inequality, attention should also be focused on the ‘how,’ the mechanisms that bring about these disparities (Reskin 2003). Research on the sex composition of occupations is hardly immune to this observation. Feminization is easily one of the most elusive sociological concepts in recent years. The growing number of accounts of sex differences at work and disparities in work outcomes are primarily descriptive in nature and not explanatory. *How* the differences arise for men and women remains underexplored. Certainly, studying changes in the sex composition of occupations can shed some light on the process by which these changes arise. Yet, while the term ‘feminization’ implies process, data limitations have required the study of feminization primarily as an outcome of occupational change, after the point of hire. All events that occur prior to employment are obscured. Human capital theory considers these events, or ‘tastes,’ exogenous to feminization. For sociologists, however, worker preferences and the constraints upon them pose an interesting puzzle to explain how people come to supply themselves to occupations (Correll 2001, 2004).

Unfortunately, the process of becoming an employee of the occupation is rarely visible. This is because most occupations that have experienced feminization have not had extensive or highly-regulated prerequisites for entry, and applicant data is typically not available. The rarity

of such data makes the information they contain incredibly valuable to labor market researchers. Only two known quantitative analyses of social networks and gender in organizations examine job applicants, though for both, the focus was not feminization. In each, the data comprised applicants to a single employer: a high-technology organization and a retail bank (Petersen, Saporta, and Seidel 2000, Fernandez and Weinberg 1997). In the former, controls for age and education explain all of the sex differences in hiring, while the latter finds a small positive effect of being female on being offered a job. These studies illuminate much of the process by which employment gatekeepers make hiring decisions and match workers to jobs. However, they do not attempt to explain gender differences in workers' initial choice to apply.

In some occupations, however, the primary gatekeeper is not an employer. Instead, institutions of higher education and professional schools, which regulate the flow of persons into a specific profession, function as an earlier entry point. The passage of Title IX in 1972 formally prohibited any federally-funded education program, including higher education, from engaging in sex discrimination. It states simply

No person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of or be subjected to discrimination under any education program or activity receiving Federal financial assistance.

Two years later, the Equal Opportunity in Education Act of 1974 served to further equalize educational opportunities in primary and secondary education. Thus, as schools gradually became required by law in the early 1970s to refrain from discrimination, including in the admissions process, the sex composition of higher education has become increasingly bound only by the sex composition of the applicant pool itself.

Reskin and Roos (1990) suggest that for the professional and managerial occupations that women entered *en masse* in the 1970s, the women's movement could be partially credited. This

contention is consistent with other research on changing occupational aspirations (Marini and Shu 1998). In this instance, changing public opinion and legislation allowed women to expect equal treatment not only in the workplace, but also in educational programs. As a result, women's occupational aspirations were demonstrated by their high rates of entry to previously male-dominated professions.

As a result of increasing educational opportunities, women became freer to move into the educational tracks of occupations that were previously dominated by men. As this occurred, the sex composition of occupations may have increasingly reflected occupational choices in spite of ever-present structural constraints. Indeed, sociological research has decisively shown that as women's numbers have increased in the workforce, they have not entered all occupations at the same rate. For example, since 1970, women have increased their representation substantially in pharmacy and real estate sales, while virtually avoiding mechanical engineering altogether (Reskin and Roos 1990). Certainly, discrimination and harassment may play a strong role in this disparity (e.g. O'Farrell and Harlan 1982). However, this observation compels research to investigate the extent to which supply-side factors influence workers' interest in an occupation.

CHAPTER THREE

FEMINIZATION OF THE HEALTH PROFESSIONS

The practice of medicine is thought of as a traditional profession. The training period is lengthy and expensive, its occupational prestige is consistently ranked among the highest (Blau and Duncan 1967), and the earnings potential is enormous compared to other occupations. Historically within the broad umbrella of the health professions, however, there has been sharp sex segregation between the fields of specialization. The less prestigious, lower-paying, “supportive” medical roles, such as registered nurses and dental hygienists, have traditionally been the realm of women, while the more autonomous, highly remunerative specialties – physicians and surgeons, osteopathic medicine, dentistry, optometry, pharmacy, podiatry, and veterinary medicine – have been predominantly male domains. While the influx of women into these traditional male strongholds in the last thirty years has been heralded as a great advance for women, the strong growth of the female labor force in the 1970s makes the increase in women’s representation in these professions not particularly unexpected. Of greater interest is the fact that the rate of female entry to each specialty area has not been consistent. For example, women have made inroads into pharmacy and veterinary medicine at much faster rates than in podiatry and dentistry. For sociologists, explaining this asymmetry is vital, as comparisons of women’s disproportionate rate of entry may make the mechanisms of feminization more readily apparent. These mechanisms may be more obvious within the areas of specialization in the medical field, which might experience more of the same historical effects, than within comparisons to less-related fields, such as law or the clergy. Furthermore, this process may be most evident in these professions because highly-specialized education is a prerequisite for entry. Professional

education programs typically have limitations on the number of people that can enroll each year. Thus, the changing sex ratios in the educational conduit can yield insight into the changing sex composition of the professions themselves.

For decades, colleges and universities have functioned as gatekeepers to the health professions. All the educational programs for the male-dominated health professions experienced significant increases in female enrollment in the late 1960s and early 1970s. Federal initiatives, coupled with changing social norms, led to the increased enrollment of women. During this period, capitation grants were made by the Department of Health, Education and Welfare to schools for the health professions, including schools of medicine, dentistry, osteopathy, veterinary medicine, optometry, podiatry, pharmacy, nursing, public health, and allied health. These grants required schools to give assurances that they would expand first-year enrollments to meet the nation's health manpower needs and stave off an expected shortage of practitioners (*JAVMA* Editorial 1972 160:588). At the time, not only were the health care needs of the public growing, but they were coupled with regional inequalities in the distribution of health care workers.

The schools did indeed increase enrollment. The Health and Labor Appropriations Act of 1971 made \$105 million available for construction for colleges of medicine, veterinary medicine, podiatry, pharmacy, and optometry, including \$3 million for institutional grants specifically for the veterinary medical colleges. The federal monies allowed expansion of the first-year classes, and “opened new opportunities for minorities and disadvantaged young people” (*JAVMA* Editorial 1975 163:430). Over the course of the twelve years between 1966 and 1977, the medical colleges assured an average yearly increase of 357 first-year student places to become available upon completion of construction. During this same period, the dental colleges

averaged 102 new places in first-year student classes and the veterinary colleges averaged 39 new places (Berman and Rosenthal 1978). The other health professions schools expanded similarly. Table 1 presents the sex composition of the first-year class enrollment in six of the health specialties, allopathic medicine, veterinary medicine, dentistry, pharmacy, osteopathy, and optometry, between 1970 and 1999. Of the traditionally-male health professions, dentistry was second only to podiatry in having the lowest percentage of women enrolled in the 1970s. In contrast, during this same period, veterinary medicine was second only to pharmacy in terms of the greatest percentage of women enrolled. However, enrollment was not a zero-sum situation. Due to the expanded number of first-year spaces and new schools for the health professions, it was not the case that an increase in the number of women entailed a corresponding reduction in the number of men. In fact, male first-year enrollment in these fields continued to grow during the early 1970s even as the number of women enrolling increased, and reached its peak in all the medical specialties during the 1970s. Male veterinary enrollment peaked in 1972 at 1,483 first-year students, while male first-year medical enrollment crested six years later in 1978 at 12,339 students. Male dentistry enrollment also peaked that year with 5,301 first-year students.

Reskin and Roos (1990:42) propose that in feminizing occupations that require higher levels of education, two possible scenarios may occur: Either the training program lowered educational standards, or the educational program began to admit previously-excluded groups. In the professions, they suggest, lowered educational standards are unlikely. The historical evidence suggests that the latter explanation is more descriptive of the health professions. As a result of the Congressional pressure to increase production of health professionals, the schools increased their enrollment. At the same time, receipt of federal funding meant that the programs could not as easily discriminate against women and racial minorities. Section 799A of the

Comprehensive Health Manpower Training Act of 1971 prohibited any health professions school, public or private, from receiving government funding unless assurances were made that no discrimination on the basis of sex in the admissions process would occur. Thus, women could compete for the limited number of first-year spaces in health professions programs with more assuredness of entry. Brown (1987) suggests that the colleges may have anticipated this law as a logical extension of the 1964 Civil Rights Act, and thus opened their doors to women in large numbers earlier than prescribed by law.

Despite the expanded class sizes and increased number of schools for the health professions, the number of male first-year students in most of the male-dominated medical specialties began a long downslide after peaking in the 1970s. Only the schools of osteopathy and podiatry experienced consistent growth in the number of male first-year students through the early 1980s. The downturn in male enrollment is striking because, prior to the 1970s, male enrollment in the health professions generally had increased gradually for decades.

What led to the decrease in male enrollment in most health professions specialties in the mid- to late 1970s? A reduction in the number of qualified students may partly explain the phenomenon. One approximate measure of the number of qualified students would be the number of Bachelor's degree recipients in a given year, as no specific undergraduate major is required for enrollment in health professions schools. In 2002, for example, approximately twenty percent of students accepted to medical school were social science majors (Association of American Medical Colleges 2002). Therefore, while not all health professions students necessarily went directly from undergraduate programs to the medical schools, this measure might be suggestive of the pool of likely applicants. As expected, after years of consistent growth, the number of men graduating with Bachelor's degrees each year decreased gradually

between 1973 and 1980, though it should be noted that during this period, the number of male graduates remained higher than it had been through much of the 1960s (Table 2). However, despite regular increases in the number of male Bachelor's degree recipients after 1980, the enrollments of male medical, dentistry, and veterinary students continued to decline. While male dental enrollment stabilized after 1990, recent data suggest the trend in declining male enrollment has not changed for medical and veterinary students. The first-year classes in medical schools have posted negative male enrollment growth every year since 1979 and the trend appears to be accelerating. Male medical school enrollment has averaged a 1.5 percent decline per year since 1979, while male veterinary enrollment has declined at twice the rate, averaging a 3.0 percent annual slide.

The consistent decline in male health professions enrollments despite renewed growth in the number of Bachelor's degree recipients suggests that other factors are involved in predicting enrollments. Accordingly, the declining male enrollments might be better explained by examining a measure of interest in the health professions – the number of applicants to the programs. As the most consistently-collected and complete applicant information exists for medical and veterinary medical colleges, they serve well as comparison groups. Figures 1 and 2 present the number of applicants to the United States medical and veterinary medical colleges since 1970, respectively. The peak for male medical school applicants was 1975 with almost 34,000 applicants that year. Male veterinary applicants peaked as late as 1976, the first year the veterinary colleges began keeping consistent applicant data. For both specialties, male applications dropped precipitously during the 1970s and 1980s. Between 1976 and 1989, male medical applicants dropped 49 percent, while male veterinary applicants plummeted 83 percent during the same period. Female applicants to the two specialties reacted differently. Female

veterinary applicants mirrored their male colleagues, tumbling 41 percent between 1976 and 1989, while female medical applicants grew slowly during the same period (3 percent). After 1984, medical school applicants of both sexes appeared to be responding to the same historical influences, as their graphs roughly parallel each other thereafter. For the first time in 2003, the number of female medical applicants exceeded that of male applicants. The case is very different for veterinary school applicants. While there were fewer applicants of both sexes between 1976 and 1990, the number of female applicants first outstripped male applicants in 1983. Male applicants rebounded slightly after 1990, but the figures do not suggest convergence with women at any point in the near future. In fact, since 1996, their trend lines appear to be diverging.

For the first time, in 2003, the number of women applying to medical school was greater than that of men. Slightly more men than women enrolled: women comprised 49.7 percent of the first-year medical classes that year. Currently, this is the smallest sex gap among the health professions that are still converging toward parity. Correspondingly, in 2002, women comprised 44 percent of the medical school graduates. Given that the number of female Bachelor's degree recipients continues to outstrip male recipients, it is not unreasonable to anticipate that the number of women enrolling in and graduating from medical schools will soon be greater than men. Therefore, it is expected that the case study of trends in veterinary medical education may be strongly suggestive of the current trends in human medicine.

The Feminization of Veterinary Medicine

In 1960, men comprised over 98 percent of the veterinarians in the United States (U.S. Census Bureau 1960). In the subsequent four decades, men have very nearly lost their

dominance and the profession is rapidly approaching parity (Table 3). Some research has predicted professional sex equality to occur in 2004 (KPMG Peat Marwick 1999) or 2005 (Getz 1997). However, this integration is not due to male flight from the field (Verdon 1997). While many occupations, including those that have feminized, have high rates of employee turnover, professions are more likely to retain their workers for life (Reskin and Roos 1990). Thus, veterinary medicine, like the traditional professions of law and human medicine, experiences relatively little cycling out of workers. As a result, the sex composition changes in the health professions, including veterinary medicine, have resulted primarily from the increase in the number of female practitioners, not the loss of male workers.

The increase in the number of female veterinarians can be tracked to growth in the number of female veterinary students. As with the other schools within the health professions, Congress mandated not only an increase in the number of practitioners produced, but equality in educational opportunities through Title IX as well. The Congressional Veterinary Medical Act of 1966 provided funds for the construction of new educational facilities for veterinary colleges. Some states that did not have veterinary medical colleges created them and the existing colleges increased their class enrollments.

Due to the extensive education required to become a veterinarian and the limited number of places in first-year classes in the colleges of veterinary medicine, the channel to becoming a veterinarian is limited and easily scrutinized. Since 1988, more women than men have graduated from United States veterinary programs (Figure 3). Given that most veterinary programs require four years of study, 1984 was the first year that more women were enrolled than men (Figure 4). Due to low attrition (Weber 1967, Hooper and Brown *nd*), the sex composition of graduates

closely parallels that of first-year enrollers. These trends in enrollment and graduation have been continuous and men have not outnumbered women since.

As with all the male-dominated health professions, the veterinary medical colleges have historically acted as gatekeepers to the profession. While the first woman graduated from an American veterinary medical college in 1903, most of the veterinary programs only accepted token numbers of female students in the first half of the twentieth century. Many of these women had fathers in the profession or other “legacy” ties that prompted their admission (Association for Women Veterinarians 1997). Other schools turned female applicants away, while claiming not to receive any applications from women (Clark-Keyser 2003). Still other programs had quotas or only accepted women after legal persuasion. One of the last schools to integrate was the veterinary school at Texas A&M University, which did not accept women until required to do so by law in 1963.

The gender queuing perspective (Reskin and Roos 1990), the theoretical explanation of the supply and demand processes that occur when employment takes place, is also applicable to occupations that have the prerequisites of substantial training, advanced education, professional examinations, or state certification. For such occupations, the training program or professional education acts as an earlier part of the queue. In the case of veterinary medicine, the vast majority of veterinarians currently in the United States earned their degrees in highly-structured four-year programs from one of only 27 United States veterinary medical colleges after completing at least two years of undergraduate education (see Appendix A). Admission is competitive to these schools, with schools typically receiving three times as many qualified applications as there are places in first-year classes. Indeed, it has historically been more difficult to be admitted to veterinary colleges than medical colleges (Little 1978, AAVMC

1986). Thus, the highly-structured nature of the education in veterinary medicine, a rapidly-feminizing occupations, may provide a unique perspective on the process of occupational feminization, as well as provide insight into changes taking place in other professions that have experienced an influx of women, particularly human medicine.

The Present Research

Given the gatekeeper status of the veterinary medical colleges, information on enrollment and graduation is important to a complete analysis of occupational feminization. Yet, with the growing equality in educational opportunities for women in the 1970s, the sex composition of applicant pools must be addressed. Therefore, the primary question the present research will address is “Why the change in who wants to enter?”

There is some evidence that the decision to become a veterinarian is an early one, at least for women. In a national survey of female veterinarians, Robinson (1978) found that 46 percent of female veterinarians had made the decision to become a veterinarian before the ninth grade, and fully two-thirds had made the decision before graduating from high school. However, by only surveying successful practitioners, Robinson could not determine whether people who did not complete the educational requirements differed in their age at initial aspiration. By studying only those who are successful at their work, those who have made it through training and currently identify themselves as employed in a certain occupation or profession, much of the feminization process may be ignored.

In an attempt to circumvent this problem, this research uses an analysis at the level of the professional gatekeeper – the veterinary medical colleges – which may reveal more of the process of feminization than a study of the end result – the population of practicing veterinarians.

Some research has examined the ambitions of veterinary medical students. Though her primary focus was not feminization, Albin (1982) surveyed veterinary students to determine the influence of the social class background of parents on the retrospective aspiration to become a veterinarian. However, as with the previous research, by only studying successfully enrolled veterinary students, the unsuccessful candidates are excluded. Enrolled students may not accurately reflect all aspirants, and the unsuccessful candidates may be the primary contributors to the feminization process. Of course, one could attempt to understand feminization even earlier in the process, by focusing on children, though only weak links exist between childhood aspirations and later employment (Jacobs 1989b). While the present research does not attempt to study children in their occupational choices, this research does avoid the pitfall of studying only professionally-identified veterinarians and veterinary students.

The present research relies upon 21 years of data on applications to the American veterinary medical colleges. Applicant data is perhaps the best measure of interest to enter the profession. Yet, for an historical study of this type, survey data would be suspect. For example, it would prove difficult to locate persons who had once considered becoming a veterinarian but ultimately did not apply to a veterinary school. Even if this task were feasible, it would prove even more difficult to determine precisely why prospective applicants ultimately did not apply at any given point in time. Respondents may not be able to recall accurately their reasons for not applying.

Similarly, surveying applicants is problematic. The most accurate contact information obtainable would be for veterinary applicants for the 2004-2005 academic year, as contact information is most reliable the more recently it is collected. Thus, locating applicants from previous years would be increasingly difficult the further in the past that persons applied. If the

perspectives of current applicants differ from those of applicants in the 1970s and 1980s, when the veterinary schools were first experiencing feminization, surveying recent applicants is unlikely to illuminate the process of feminization in this occupation. To overcome this problem, one could survey “successful” applicants from years past. Successful applicants, those persons who graduated from the veterinary programs, can be located because the American Veterinary Medical Association maintains contact information for the majority of current practitioners. However, this database does not include all practicing veterinarians and excludes persons who have retired or otherwise left the profession. Furthermore, as discussed above, surveying successful applicants excludes the unsuccessful applicants and those who did not complete the educational programs. Unsuccessful applicants, persons who did not complete the programs, and persons who have left the profession may all differ from successful, currently-practicing veterinarians in their reasons for applying to the veterinary colleges. Regardless, even if an unbiased sample of all applicants from years past could be obtained, the further in the past that persons applied, the greater the likelihood of inaccurate recollection as to why they applied.

The responses of current applicants to queries suggest additional methodological concerns:

“When we interview male and female applicants, they still tell us that they have always wanted to be a veterinarian. When we broach the subjects of loans and average salaries, the response is, ‘I don’t care, I have always wanted to do this.’”
Burns (2004)

Given that the competition for positions in entering classes is keen, applicants may be unwilling to articulate well-developed explanations for why they applied. Furthermore, and more likely, applicants may not truly know why they applied. In short, survey data appears to be fraught with more potential error than data on actual applicant behavior. Thus, this research uses the tactic of examining changes in the annual number of applicants to the veterinary medical colleges to infer

applicant decisions and structural constraints. The indirect approach of the present research is expected to offer a more detailed historical analysis of feminization processes than survey data could provide.

There are additional benefits to this research. Many of the methodological issues discussed in Chapter 2 can be addressed through this case study of veterinary education. The primary advantage of this study is its focus on applicants to the programs. Any study of employed veterinarians is limited in its ability to explain occupational feminization because veterinarians have had to pass through a gatekeeper, the veterinary medical colleges, which may enroll and graduate different proportions of men and women than which initially applied. A focus on applicants to the schools more closely approximates the actual agency of actors. Thus, examining the annual change in the number of male and female applicants over two decades should prove methodologically useful to elucidating changes in the sex composition of the veterinary education programs and the profession itself. Further, by focusing on the educational track, which occurs prior to employment, there is no issue of insufficient detail in the one Census occupational code assigned for veterinarians. This avoids the problem of relying upon any aggregation of occupations, even within detailed occupational codes, which limits the differences that exist between industry sectors. For example, the detailed Census occupational code 195, editors and reporters, is comprised of book, newspaper, magazine and broadcast editors and reporters. Within each of these jobs, Reskin and Roos (1990) found that changes in sex composition varied markedly. This finding is consistent with Weeden's (forthcoming) conclusion that researchers of sex segregation should focus on occupational case studies or industrial sectors, due to the different historical trajectories of integration and segregation within different occupations. Finally, the relative closure of the field to non-native veterinarians (Getz

1997) makes it more certain that the application and admissions data capture of the process of feminization approximately four years prior to entry into the profession in the United States. Thus, it is expected that an historical study of changes in the applicant pool will prove beneficial for understanding the supply side of feminization. By focusing on nuances of the feminization process of the profession's educational system, it is possible to gain a greater understanding of feminization at the professional level.

Hypotheses

This research proposes to test three broad theories that have been gleaned from the literatures on sex segregation and feminization. Within these three distinct categories, I propose specific hypotheses related to the number of male and female applicants that veterinary medical colleges receive in a given year. The first theory relates to the existence of women in an occupation, which I call the "female presence" theory. I develop four specific hypotheses to test the effects of the growing presence of women in veterinary medicine on applicants. The second theoretical expectation relates to the wages of an occupation. To test the "low wages" theory, this research presents two tests of the effect of starting salaries on applicants to the veterinary medical colleges. Finally, the third theory addresses the wages of an occupation relative to other occupations. This research tests six hypotheses relevant to the "relative wages" theory.

Female Presence Hypotheses

The literatures on sex segregation and feminization often suggest that the presence of women in an occupation may signal that the occupation has undesirable characteristics or, if the occupation is in transition from one sex to the other, that it will soon have undesirable

characteristics (Strober 1984, Reskin and Hartmann 1986, Reskin and Roos 1990). These characteristics may be low wages, few chances for promotion, low job security, or low occupational prestige. Additionally, men may value the attributes of all-male occupations. Men may simply prefer to work with other men, perhaps to preserve their masculinity (Williams 1989), though this hypothesis may be more relevant for blue-collar occupations than others (Reskin and Roos 1990). These sociological explanations of feminization are reflected in popular discussions:

“Men are saying, ‘I don’t want to be in a field that is predominantly women.’”
– U.C. Davis director of admissions (Gose 1998)

Therefore, it is expected that:

H1: Female enrollment at the veterinary medical colleges each year will have a negative effect on the number of male applicants to a veterinary medical program the following year.

Similarly, it is expected that:

H2: Female faculty employed by the veterinary medical colleges each year will have a negative effect on the number of male applicants to a veterinary medical program the following year.

Conversely, the presence of women may serve as an incentive for other women to apply.

This could arise for several reasons. First, theories of homophily suggest that most social contacts are between people who are similar (Blau 1977, McPherson, Popielarz, and Drobnic 1992), though these contacts are not necessarily the result of individual choice (Smith-Lovin and McPherson 1993). Similarly, most network contacts are formed in homogenous groups (Bielby and Baron 1984). Thus, information networks are, in part, sex-based, and women will tend to distribute information about employment or education opportunities to other women (Granovetter 1973, 1985, Hanson and Pratt 1991, Drentea 1998). Based on these theoretical perspectives, it is hypothesized that

H3: Female enrollment at the veterinary medical colleges each year will have a positive effect on the number of female applicants to a veterinary medical program the following year.

Additionally, the presence of women in an occupation can show that the field is attainable for other women. Women may serve as mentors and role models, as well as influence internal processes to allow subsequent women to be accepted and promoted (Cohen, Broschak and Haveman 1998). For example, female faculty may serve on applicant recruitment committees or encourage promising female undergraduates to apply. Thus, it is expected that

H4: Female faculty employed by the veterinary medical colleges each year will have a positive effect on the number of female applicants to a veterinary medical program the following year.

Other measures of the number or proportion of women in the occupation at the state level are collected too infrequently to be reliable for analysis.

Low Wages Hypotheses

Workers strongly consider occupational remuneration and attempt to maximize income when choosing employment (Jencks, Perman, and Rainwater 1988). The veterinary literature has remarked upon this concern considerably and linked the growing presence of women in the field to low wages (Stogdale 1985, Miller 1998, Wolff 1998). The issue has also been discussed in the popular discourse about the feminization of veterinary medicine:

“If you’re a guy who’s thinking, ‘I need to be the major breadwinner,’ or ‘I just want to get stinking rich,’ then this is not the job to be in.” (Gose 1998)

Thus, the salaries of feminizing occupations may be expected to deter future applicants.

H5: Salaries of recent veterinary school graduates will have a negative effect on the subsequent number of male applicants to a veterinary medical program.

As discussed earlier, the human capital approach suggests that women choose occupations for different reasons than men (Becker 1985). This perspective is also reflected in popular discourse about veterinarians:

“Women in general choose careers different from men. Women choose a career they feel passionate about. Men love animals but they feel the obligation to support a family.” (Zhao 2002)

This research takes the sociologically-informed approach that, although women value income to the same extent as men do, women will be motivated to move into a previously male-dominated occupation that is more lucrative than other female-dominated occupations (Reskin and Roos 1990). In other words, veterinary medicine may not be appealing to men who are looking to maximize income, or it may become less appealing if veterinary earnings potentials drop. However, veterinary medicine is a financial step up for women compared to other occupations that have been typically been available to them. Therefore,

H6: Salaries of recent veterinary school graduates will have a positive effect on the subsequent number of female applicants to a veterinary medical program.

Relative Wages Hypotheses

This research proposes a test of the thesis that declining real earnings in an occupation promotes feminization. If, as has been posited, veterinary earnings are stagnating relative to the average worker’s income, then a ratio of veterinary starting salaries to the mean per-capita earnings in a state should be predictive of the number of male applicants a school receives. However, because women earn much less than men, on average, it is logical to separate earnings by sex when such data exist. Therefore, the first test of the relative wages thesis will compare

the private practice salary offers, which should be similar for men and women, to the mean labor force earnings of men and women in a state.

H7: The gap between veterinary starting salaries and the average male worker in a state will have a negative effect on the subsequent number of male applicants to a veterinary medical program.

H8: The gap between veterinary starting salaries and the average female worker in a state will have no effect on the subsequent number of female applicants to a veterinary medical program.

Starting salaries may not be the only consideration of veterinary aspirants. Certainly, expected earnings later in the career may be of importance to persons, particularly those who contemplate careers that require extensive education. The feminization literature suggests that an occupation whose earnings decline relative to that of the male labor force may fail to draw or retain enough men to outpace feminization. Therefore,

H9: The wage gap between veterinarians and the male labor force in a state will have a negative effect on the number of male applicants to a veterinary medical program.

However, as before, because female-dominated occupations pay, on average, less than male-dominated occupations, it is expected that veterinary salaries will be more appealing to women than those of other occupations. Thus, it is expected that

H10: The wage gap between veterinarians and the female labor force in a state will have no effect on the number of female applicants to a veterinary medical program.

Finally, the hypotheses in this research incorporate the theory that occupations “compete” within an ecology for qualified workers and that the sociodemographic compositions of each field are relative to each other such that declines in one correspond to increases in another (Rotolo and McPherson 2001). Within broad areas of employment interest, workers may weigh similar occupational tracks and attempt to enter them according to their relative rankings in each

worker's queue (Reskin and Roos 1990). Thus, in addition to considering relative labor force earnings, aspiring veterinarians may weigh other similar occupational tracks in the health professions. Professional veterinarians compare themselves most to physicians. Indeed, veterinarians have long chafed under a stigma of being mere "horse doctors" while not being afforded the prestige of their counterparts in human medicine. Scrutiny of the veterinary literature reveals that, for decades, veterinarians have long compared themselves to physicians when discussing professional recognition and income (*JAVMA* Editorial 1967:1536). This is not unexpected, as the educational preparation for both fields is largely analogous. In fact, so similar is the training between veterinary medicine and human medicine that at some veterinary colleges, the basic courses for both programs have historically been combined, and future physicians and veterinarians have taken many of their basic courses together (Redisch 1971). Further, *Veterinary Medical School Admission Requirements*, published annually since 1985 by the Association of American Veterinary Medical Colleges, prints applicant and admission statistics. These statistics typically include a comparison of application and enrollment rates at medical colleges and the veterinary colleges. However, this comparison is not symmetrical. It is telling that the parallel publication of the Association of American Medical Colleges, the *Medical School Admission Requirements*, does not publish similar statistics on veterinarians. Recent discourse in *The New York Times* reiterates this perspective of comparing physician salaries to veterinary salaries:

[Feminization] "has occurred because veterinary salaries are not competitive with those of other medical professions" (Zhao 2002)

and

"Vets are people with medical degrees without the medical income" (Zhao 2002)

Therefore, it is expected that

H11: The wage gap between physicians and veterinarians in a state will have a negative effect on the subsequent number of male applicants to a veterinary medical program.

As before, this research expects that women and men differ little in the extent to which they value an occupation's income. However, because the occupations that have historically been available to women have not been particularly lucrative, veterinary medicine should be financially more appealing. Therefore, this research expects to find that

H12: The wage gap between physicians and veterinarians in a state will have no effect on the number of female applicants to a veterinary medical program.

CHAPTER FOUR

RESEARCH DESIGN AND METHODOLOGY

Data

This research assesses the effect of organizational and economic variables upon male and female applicants to American veterinary medical colleges. The goal of this research is to test three theoretical explanations of feminization that have been distilled from the feminization literature. To do so, the analyses rely upon an amalgamation of data sources.

The primary data source for this research is the *Comparative Data Reports*, a confidential annual survey of all United States veterinary medical colleges conducted by the Association of American Veterinary Medical Colleges (AAVMC). This organization first began collecting detailed data by survey from all United States veterinary medical colleges in 1967. The AAVMC compiles these data, keeping them largely in raw format. The organization sends the resulting data summary to the deans of the veterinary medical colleges each year, who then may use the information to compare their programs to others. The data are presented anonymously in random order each year, but a separate codebook permits identification of each school. These data comprise organizational information on each veterinary medical college. As with many longitudinal surveys, the survey evolved over time to include information on a greater number of variables. Between 1968 and 1974, the surveys included only basic information on each veterinary college, including enrollment by sex, number of faculty, and mean faculty salaries. In 1975, the schools began reporting attrition from the programs and number of graduates. By 1976, the data had begun to include information on the race and sex of applicants to the schools, as well as the sex and race composition of the faculty, and indebtedness of the students.

Data on the veterinary profession itself was extracted from the *Veterinary Demographic Data Reports*, a survey intermittently published by the American Veterinary Medical Association (AVMA). Additional data on the composition of both the schools and the profession were culled from the *Journal of the American Veterinary Medical Association*. (See Appendix B for citations of these data sources.)

Finally, state-level data were drawn from several sources. The number of Bachelor's degree recipients per state each year was obtained from the National Center for Education Statistics. Unfortunately, state-level data on the sex composition of bachelor's degree recipients has only been collected sporadically and is insufficient for analysis (Snyder 2004). Data on the average male and female incomes in each state and average veterinarian and physician salaries in each state were computed from the U.S. Census Bureau's *Decennial Census* and *Current Population Surveys* (King, Ruggles, and Sobek 2003). Only two Censuses, those conducted in 1980 and 1990, fit within the time frame of this research. For these two years, the Integrated Public Use Microdata Series (IPUMS) at the University of Minnesota was accessed electronically to compute salary data for veterinarians and physicians in each state (Ruggles *et al.* 1997). A five-percent sample of United States housing units and the persons within is available for both 1980 and 1990 from the IPUMS. Further, this dataset includes weights so as to permit the sample to be representative of the U. S. population. Weights were used in calculations for national data from 1960, but not used in state-level regressions.

Census data are useful for capturing snapshots of the nation, but have the primary drawback of being conducted only once every ten years. For a rapidly-feminizing occupation such as veterinary medicine, these time periods are not sufficient to capture enough of the detail of the changes that are occurring. Indeed, the Census was conducted only twice during the 21-

year period contained in this study. In addition, the *Current Population Survey* does not contain enough veterinarians and physicians in each state to compute their mean earnings. To compensate for the limited collection points of the Census, two additional years of physician and veterinarian salary data were compiled from publications of the American Medical Association (Glandon and Shapiro 1980) and the American Veterinary Medical Association (AVMA 1996). This technique permits analysis of five years of salary data during the two decades that this research covers. Thus, most of the schools have physician and veterinarian salary information collected at five points in time (1978, 1980, 1985, and 1990, and 1995). Eight schools (Iowa State, Kansas State, Mississippi State, North Carolina State, Oregon State, Tufts, Virginia-Maryland, and Wisconsin) have fewer than five income collection points because they were not in existence in 1978 or 1980. For the two non-Census data sources (AVMA and AMA), it is not possible to determine sex differences in salaries. Therefore, only mean earnings in the state is used as an independent variable. (See Appendix B for citations of data sources.)

The data are unbalanced panel data, as the same schools report each year, but there are varying numbers of observations over time for each school. Since 1975, the first year observed in this study, eight additional American colleges of veterinary medicine have opened, bringing the total to twenty-seven. The most recent school to open is the University of Wisconsin, which began admitting veterinary students in 1983.

Dependent variables

Independent analyses are conducted on each of the dependent variables: the number of qualified male and female applicants to each of the American veterinary medical colleges each year. Applicants serve as a proxy for the actual number of qualified individuals interested in

entering the profession in a given region. The unit of analysis is the veterinary medical college each year. The number of qualified applicants was first reported by individual schools for the 1976-1977 academic year. Qualified applicants are defined as those who meet the school's minimum standards for application. These minimum standards vary both historically and from school to school, but are typically comprised of two years of undergraduate education, a minimum grade point average, and specific test scores on the Graduate Record Exam or Veterinary Aptitude Test (Association of American Veterinary Medical Colleges 1985-2002). Some schools require applicants to take the Medical College Admission Test or specific subject tests of the GRE. The number of unqualified applicants is typically not reported. The number of applicants variables are adjusted by one year to address timing differences between date of application for the upcoming academic year and the schools and market conditions of that year. Applicants must apply prior to an academic year's beginning and thus would be influenced by conditions at least one year prior to applying. The analyses bear out this assertion that a one-year correction results in the best-fitting model.

Educational training to enter the veterinary profession is unlike many other professional programs. Unlike medical schools, not every state has a veterinary medical college, and of the states that do, there is only one veterinary college in each state. Alabama is the sole exception – it has veterinary colleges at Auburn University and Tuskegee University, an historically Black college. Additionally, most of the American veterinary colleges have historically preferred students who are residents of the state to nonresidents. During the period under study in the present research, Texas A&M did not admit any out-of-state residents and advertised as such in the annual Veterinary Medical School Admission Requirements publication. Thus, the schools have generally operated as state institutions first and professional institutions second. The logic

has been that the schools operate primarily for the benefit of the residents of their state, with less responsibility for the residents of other states. Some schools, particularly those that are the only veterinary medical college within a radius of several states, sometimes have formal agreements with specific states that do not have a veterinary medical college that allow them to accept a small number of out-of-state students. For example, Washington State University has a formal education contract to consider applications from residents of Idaho, but also has typically accepted a very small number of students from Alaska, Hawaii, Montana, Nevada, and Arizona, none of which have a veterinary medical college. In turn, many states that do not have veterinary medical colleges only contract with a single other state. Regardless, the vast majority of students accepted to the veterinary colleges are residents of the state in which the college is located (Pritchard 1989). This is consistent with Getz' (1997) finding that the presence of a veterinary school in a state increases by fifty percent the probability that a high school graduate resident would enter a state's school of veterinary medicine. Thus, to a large extent, unlike the other medical professions, persons interested in obtaining veterinary training historically have been limited to applying to a single institution (Runnels *JVME* 62-65). Therefore, while a person in 1977 theoretically could have applied to the 22 American veterinary medical colleges then in existence, most schools would not consider the person a qualified applicant due to residency requirements.

Independent variables

Detailed information on the independent variables is specified in Table 4. The *year* of the study controls for any period-specific effects during the period under consideration due to a linear decreasing trend. Year is a continuous variable and begins with 1975, the year prior to the

first academic year for which qualified applicants applied (1975=1). Additional organizational-level control variables address whether the school has a *formal education contract* with another state, whether it is in the *South*, the number of positions available in the entering class (*class size*), and the cost of *tuition*. Other regional variables tested yielded less promising models and are not reported.

The “female presence” hypothesis suggests that men may prefer to avoid working with women, or they may prefer to avoid occupations that are associated with women because the presence of women signals undesirable characteristics in the occupation (Strober 1984, Reskin and Hartmann 1986, Reskin and Roos 1990). To test this hypothesis, the analysis includes both the *percentage of women enrolled* in the first-year cohorts and the *percentage of female veterinary faculty* in the veterinary program. The use of percentages rather than frequencies controls for differences in the absolute size of the schools’ faculty and veterinary program.

The “low wages” hypothesis suggests that men may turn away from an occupation due to its declining wages. The *Comparative Data Reports* presents the average private practice salary offer made to graduates each year through 1988. The *CDR* also reports the average assistant professor salary in the veterinary medical colleges through 1988. Thus, this research uses the salaries of two distinct fields of practice as measures to test the “low wages” hypothesis.

Finally, several state-level economic variables are theoretically relevant for the “relative wages” hypothesis. As discussed earlier, state-level data are important because of a strongly-regulated preference by the schools for state-resident students and the limited number of veterinary colleges (one per state, except Alabama, which has two³). To a large extent, unlike

³ The Tuskegee Institute is an historically black college that has a demonstrated commitment to educate black students. Unlike the other U.S. veterinary medical programs, Tuskegee has typically accepted students from all over the country and from Caribbean nations. It is included in the analyses; excluding it changes the coefficients very little.

the other medical professions, persons interested in obtaining veterinary training historically have been limited to admission at a single institution (Runnels *JVME* 62-65). Thus, the average earnings of the male and female labor forces and the average incomes for veterinarians and physicians are used as predictors of the numbers of applications to a school of veterinary medicine. These data were computed from decennial Census data for all employed physicians and veterinarians (Ruggles *et al.* 1997). In intervening years, the decennial data are supplemented by state-level occupational earnings data from the American Medical Association (Glandon and Shapiro 1980) and the American Veterinary Medical Association (AVMA 1999). The relative salaries hypothesis is conceived in terms of declining relative earnings. Thus, to test Hypotheses 7 and 8, a ratio of the mean veterinary starting salaries to mean male and female labor force earnings in a region was formulated. Hypotheses 9 and 10 use a ratio of mean veterinary earnings in a state to the mean male and female labor force earnings in the region.

The relative wages hypothesis also proposes that veterinarians are concerned with the economic standing of the profession relative to physicians. Thus, a test of Hypotheses 11 and 12 is formulated such that the salaries of physicians in a state are expected to depress the number of veterinary school aspirants in a state, while veterinary salaries should have a positive effect on the number of applicants to the schools. Individually, these variables are highly correlated with the *year* variable, 0.9867 and 0.8547 respectively, and with each other, .9299. Therefore, in order to avoid this problem, a ratio of physician-to-veterinarian salaries was created instead. This variable is less correlated with the year, 0.1824.

Methods

Unbalanced panel data are effectively analyzed through a pooled time series of cross-sections which are robust to the issue of unequal periods between the time-series data. These data are in the form of x_{it} , for which x_{it} is a vector of observations for unit i and time t . The analyses are conducted with a random effects model using a generalized least-squares estimator. Cross-sectional time-series data are prone to autocorrelation, in which there is serial correlation in the errors of prediction for each observation over time. The generalized least-squares technique corrects for the degree of autocorrelation in time-series data and produces unbiased estimates of the standard errors.

In this case, the random-effects model is preferred to the fixed-effects model, because the fixed-effects model discards too much information about the variation among schools, which is the focus of this research (Green 1990). Further, the fixed effects model cannot be estimated for models that include time-invariant variables during the period of investigation, such as the dichotomous region indicator variable or the dichotomous private school indicator. This is due to collinearity with the school-specific intercept.

The equation for the random effects model is written as

$$y_{it} = \alpha_0 + \sum_{k=1}^K \beta_k x_{it} + \alpha_i + \varepsilon_{it}$$

in which $i = 1, \dots, N$, $t = 1, \dots, T_i$, $E[\varepsilon_{it}] = 0$, and $\text{Var}[\varepsilon_{it}] = \sigma^2$. The subscript i signifies the veterinary medical college, t signifies the year of observation, and T_i marks the number of observations for a given veterinary medical college, i .

The analyses were carried out with the statistical program STATA Special Edition version 8.2 (StataCorp 2003).

CHAPTER FIVE

ANALYSIS AND RESULTS

Separate analyses were conducted for the two dependent variables, the number of male and female applicants. Tables 5 through 10 present the separate regression results for the number of male and female applicants to the veterinary medical colleges. In each of these tables, the first model is the “baseline model.” This model is the regression of the number of applicants of each sex on the baseline control characteristics: the year, the number of spaces available in the incoming class, whether the school has a formal education contract with another state, the Southern school location, the cost of one year of tuition, and the number of Bachelor’s degree recipients in the state. Consistent with Figure 5, a general negative trend for male applicants is observed over the 21-year period, while the number of female applicants is overall rather constant. Most of the control variables in this baseline model are not statistically significant. However, the cost of tuition does have a significant negative effect on the number of male applicants. Southern schools receive significantly fewer female applicants. Finally, the number of Bachelor degree recipients in a state has a significant positive effect on the number of male and female applicants. The baseline model demonstrates that a considerable proportion of the variance in the number of applicants to the schools is accounted for by these six variables.

Female Presence

The subsequent model tests the “female presence” hypothesis. Feminization theories suggest that the presence of women in an occupation serves as a deterrent to the entry of men. It may be that women either serve as an indirect indicator of an occupation with undesirable

characteristics or it may be that men prefer to work with other men. In either case, the association of women with the field should yield a negative impact on the number of male applicants a school receives (Hypothesis 1). The first model, shown in the second column of Table 5, examines the effect of the presence of women as classmates by adding the ratio of female-to-male first-year veterinary students to the baseline model (Table 5, column 2). This ratio was created because it is less highly correlated with the *year* variable than the percentage of female first-year students (.6714 and .7311 respectively). For male applicants, the coefficient is negative, as expected, but not statistically significant. This finding does not support Hypothesis 1 and is contrary to expectations of the effect on men of feminizing occupations. The result of the model for female applicants, shown in the second column of Table 6, is similar. The test of Hypothesis 3 reveals the expected positive coefficient for the female-male enrollment variable, but this coefficient is not statistically significant. In general, the ratio of women to men among the first-year students does not have a significant impact on either the number of male or number of female applicants a veterinary college receives.

The ratio of female to male first-year students is limited in its ability to assess the effect of the changing sex composition of the profession on applicants. Unfortunately, there are no statistics on the sex composition of practicing veterinarians in each state or region of the country each year. However, the veterinary colleges report on an annual basis the number of female veterinary faculty employed. Therefore, this research employs the percentage of faculty – assistant, associate and full professors – at each veterinary college who are women as an additional way of testing the effect on the number of applicants of the presence of women in the profession. The models to test Hypotheses 2 and 4, using this alternative measure of female presence, are presented in the third column of Tables 5 and 6 respectively. For male applicants,

the coefficient for the effect of the percentage of female faculty is negative, as expected, but not statistically significant. Thus, the presence of women in the profession as faculty does not have an impact on the number of male applicants to a program, and Hypothesis 2 is not supported. In contrast, the percentage of female faculty has an unexpected negative and statistically significant impact on the number of female applicants a veterinary program receives. As a result, Hypothesis 4 is also not confirmed.

The four tests of the effect of female presence on applicants present unexpected results. Contrary to expectations, the number of male applicants to a school is not affected by the presence of women, whether this presence is measured by the ratio of female-to-male first-year students, or by the percentage of veterinary faculty who are women. Most surprisingly, the expected effect of female faculty on women (Hypothesis 4) is disconfirmed entirely. Net of controls, schools with a higher percentage of female faculty receive significantly fewer applications from women. The reasons for this are unclear.

Low Wages

The changing sex composition of veterinary medicine is one dimension of the feminization process. The other aspect investigated by this research is the economic dimension. Theories of feminization have posited that declining real earnings may serve as a deterrent to men's entry into a feminizing occupation. A feminizing occupation may experience a number of events, such as deskilling and a subsequent decline in prestige, which serves to depress wages. To test this "low wages" hypothesis, the analysis inspects two distinct aspects of veterinary earnings.

The first test examines the effect of private practice salaries on the number of male and female applicants. Since the majority of veterinary school graduates have historically worked in private practice (AVMA 1996), the *Comparative Data Reports* present the average private practice salary offer for veterinary graduates each year. In 1975, this figure was slightly over \$14,000 per year. By 1988, the average offer had increased less than \$9,000. The second column of Tables 7 and 8 presents models that test the effect of this variable on the number of applicants. It should be noted that the number of cases drops because of the time it takes for students to pass through the program from first-year enrollment to graduation. For example, although the University of Tennessee first began accepting applicants for the 1975-1976 academic year, students would not begin graduating until four years later, in 1979. Therefore, there are no salary offers recorded for Tennessee students in 1975, 1976, 1977, and 1978. For both male and female applicants, the coefficients for the private practice salary offers made to graduates are negative, as expected, but not statistically significant. The starting wages for private practice veterinarians do not serve as a deterrent to the number of male applicants a school receives, nor do they positively influence the number of female applicants to a school.

Although most veterinarians enter the private sector, some enter academia, which is more lucrative. Since the *Comparative Data Reports* present the average annual salaries of faculty, this seems an appropriate additional test of the “low wages” hypothesis. For assistant professors, the entry point for recent graduates, earnings ranged from \$20,000 in 1975 to nearly \$46,000 in 1988. Despite the higher average starting salaries in this sector of veterinary medicine, Hypothesis 5 expects that male applicants will be deterred by the earnings of assistant professors. However, this model, shown in the third column of Table 7 reveals that the impact of assistant professor salaries on male applicants to a school is not statistically significant. In contrast,

assistant professor salaries should prove appealing to female applicants, for whom these wages represent more than most female-dominated fields can be expected to earn. However, the results of this model, shown in the third column of Table 8, reveal that, as before, the coefficient is negative and not statistically significant. The salaries of assistant professors do not positively impact the number of female applicants a school receives.

The four tests of the effects of low wages on applicants presented no statistically significant results. For both male and female applicants, the direction of the coefficients for the two measures of starting salaries was negative. This finding was expected for male applicants, despite not being statistically significant. However, this result was not expected for female applicants. Starting salaries were expected to have a positive impact on the number of female applicants because male-dominated occupations typically earn more than the jobs open to most women. The reasons for these results are also unclear.

Relative Wages

Tests of the impact of actual earnings on applicants proved of little importance to the number of applicants a veterinary college receives. However, theories of feminization suggest that, for men, the wages of an occupation *relative to the male labor force* may prove to dissuade men from entering. To test this hypothesis, several ratios were computed. First, a ratio of the average private practice salary offer to the average earnings of the male labor force in a state was created. *Current Population Survey* data were used to generate the average earnings of the male labor force in each Census region annually between 1975 and 1995. Due to the low, or nonexistent, number of cases in some states in the CPS from year to year, the regional earnings of men were computed instead of state-level earnings. The larger the ratio, the more a

veterinarian is earning in comparison to the average male worker in the region. Thus, the expected negative coefficient would indicate that the smaller the ratio in a region, the fewer male veterinary applicants a school would receive. Put another way, if veterinarians do not earn much more than the average male worker in a region, then men would not be persuaded to spend the time and money for the advanced training. As expected, over the course of the study, the ratio decreases, indicating growing similarity between veterinary starting salaries and the average male labor force earnings in the region. In 1975, veterinary starting salaries averaged 21 percent higher than the average male labor force earnings in the same region. By 1988, the ratio had dropped substantially and nationwide veterinary starting salaries were only 90 percent of the male labor force earnings. The model presented in the first column of Table 9 tests the effect of this variable on the number of male applicants to the schools. Contrary to expectations, this ratio has a significant positive effect on the number of male applicants a school receives.

To test the effect of relative earnings for female applicants, a similar method was employed. A ratio of the private practice salary offers to the female labor force earnings in a region was created. As expected, starting salaries for veterinarians are higher than the average female labor force earnings. In 1975, private practice offers were 190 percent higher than the average female worker's earnings. By 1988, the ratio had decreased, but veterinary salaries were still 60 percent higher than the average woman's earnings. Hypothesis 8 anticipates that this variable will not have a negative impact on the number of female applicants to a school. Indeed, this expectation is upheld inasmuch as the coefficient for this variable is positive and statistically significant.

Starting salaries may not be the best measure of the economic considerations employed by potential veterinary applicants. They may also consider the earnings potential of the

occupation much later in their careers, or even aspire to own and operate sole proprietorships or partnerships. Given the frequent reporting by the veterinary journals of the national average for veterinary salaries (e.g. Wise 1977, Wise and Gehrke 1993, Gehrke 1996), veterinary career aspirants may weigh those earnings against the average earnings for the labor force. Therefore, Census and *Current Population Survey* data were used to generate a ratio of the average veterinary earnings in a Census region to the average earnings of the male labor force in each region for 1980 and 1990. This ratio was supplemented by mean professional earnings data collected by the American Veterinary Medical Association and the American Medical Association for the Census regions in 1978, 1985, and 1995.

Hypothesis 9 expects the effect of the veterinary-male labor force earnings ratio on the number of male applicants to be negative. Indeed, in 1975, veterinarians earned 68 percent of what the average male worker earned. However, by 1995, this ratio had increased substantially. Veterinarians earned 127 percent of the average male worker's salary that year. The third column of Table 9 presents this test of the relative wages thesis for male applicants. It should be noted that the number of cases drops because the Census is not conducted annually during the period under examination. Contrary to expectations, the coefficient for this ratio is positive and significant. This finding suggests that in comparison to the average earnings for a person of the same sex, veterinary earnings may serve as an incentive to male applicants.

A similar ratio was then computed for earnings of veterinarians and the female labor force. As with the ratio for veterinarians and the male labor force, this ratio increases over time. In 1975, veterinarians earned 53 percent more than the average female worker. This figure jumped to 267 percent of the average woman's earnings in 1995. The results of this model are presented in the third column of Table 10. The sign for this coefficient is in the expected

positive direction, but the coefficient is not statistically significant. This finding upholds Hypothesis 10, which expected to find no negative effect of this earnings ratio on female applicants.

Finally, Hypotheses 11 and 12 test the effect of the growing disparity between the earnings of physicians and veterinarians in a state on the number of applicants a school receives. Hypothesis 11 anticipates that growing earnings disparity between physicians and veterinarians may dissuade men from applying. For example, in 1975, the national earnings average for physicians was 60 percent higher than veterinary earnings. By 1995, physicians earned on average 113 percent more than veterinarians did in the United States. The results of this model are presented in the final column of Table 9. As expected, the ratio of physician to veterinarian salaries is negative and statistically significant for male applicants. This ratio negatively impacts the number of male applicants a veterinary program receives.

In contrast, Hypothesis 12 predicts that the growing wage difference between physicians and veterinarians will prove inconsequential to the number of female applicants a school receives. No impact of this ratio is expected because veterinary salaries are consistently higher than the average wages of the female labor force. As a result, the earnings potential of veterinary medicine should be appealing to female applicants. The final column of Table 10 presents the results of this model. Contrary to expectations, there is no evidence for hypothesis 12. In fact, hypothesis 12 is negated entirely inasmuch as the earnings ratio for physicians and veterinarians has a significant negative impact on the number of female applicants a school receives, as well.

The tests of the relative wages hypotheses suggest a strong impact of relative economic factors on applicants. There are two dimensions to the impact: the relationship of veterinary earnings to the general labor force and to physicians specifically. The number of male and

female applicants a school receives is positively impacted by the starting salaries of veterinary graduates and the average veterinary earnings in a state relative to the average labor force earnings of the corresponding sex in the region. For male applicants, this finding was unexpected because feminizing occupations are predicted to experience a decline in relative earnings, which then serves as to discourage men from entering. However, the descriptive statistics of starting salaries and average veterinary earnings presented above suggest a complex picture. While the starting salaries of graduates declined relative to male labor force earnings over the course of the study, the average earnings of veterinarians, in all stages of their careers, have increased relative to the earnings of the male labor force. Yet, both variables have a positive impact on male applicants. Similar findings result for female applicants. Veterinary starting salaries and average veterinary earnings are much higher than the earnings of the average woman employed in the region. Therefore, it is not entirely surprising that Hypotheses 8 and 10 found no negative impact of these ratios on the number of female applicants a school receives. Indeed, Hypothesis 8 was strongly supported, in that the ratio of veterinary graduate starting salaries to the female labor force earnings has a significant positive impact on female applicants to the schools. As a whole, these findings suggest that veterinary medicine may be financially appealing to applicants of both sexes in comparison to the average labor force earnings.

The second aspect to the impact of relative earnings is the relationship between the average earnings of physicians and veterinarians. Given the amount of discussion in the veterinary journals over the years comparing earnings potential of the two professions, the significant negative impact of this ratio was expected for male applicants. However, the finding that this ratio also serves as a deterrent to female applicants was not anticipated. This result may be an indirect indicator of the extent to which similar career considerations are made by men and

women. The population of persons who apply to veterinary school may be part of the larger population of persons considering health professions careers. Thus, it is possible that the men and women who aspire to go to veterinary school also weigh the costs and benefits of attending medical school, and indeed, other professional training programs. In regions in which physician earnings are higher, prospective applicants of either sex may be dissuaded. Correspondence with one potential applicant is suggestive of the validity of this interpretation (Horsley 2003).

The results of these analyses suggest that at the point of application to enter the professional schools for this particular occupation, many hypotheses of the effect on men of the feminization of an occupation are not upheld. Characteristics of each state and veterinary school explain most of the variation between schools in the number of male applicants they receive. Net of organizational controls, the presence of women in the field and its starting salaries are not related to the number of men who indicate interest in attending. The evidence is stronger for the importance of *relative* economic factors to men. The earnings ratio of veterinarians to the male labor force and the ratio of physician earnings to veterinarian earnings were significant predictors of male applicant behavior, although not always in the hypothesized direction.

The picture for women is more complex. Net of controls, the presence of other women enrolled in the curriculum has no impact on the number of female applicants a school receives. This finding was unexpected, because theories of homophily and networking expect same-sex networks to pass on employment, or educational, opportunities. However, the presence of women on the faculty as professors and instructors had a significant negative effect on female applicants, which serves to discount expectations of the effect of organizational sex composition on the recruitment and promotion of women. As with men, two measures of the relative economic status of veterinary medicine were predictive of the number of female applicants to a

school: the ratio of veterinary starting salaries to the female labor force earnings and the ratio of physician earnings to veterinary earnings.

Conceived another way, these findings are consistent with other research (Jencks, Perman, and Rainwater 1988), that suggests that men and women value similar attributes of employment. These findings suggest that, even in occupations that are experiencing a significant change in sex composition, men and women may experience aspects of both the structural constraints and act on their personal tastes and preferences similarly.

CHAPTER SIX

DISCUSSION AND CONCLUSION

In reviewing the literature on workplace sex segregation ten years ago, Reskin (1993:265) called for additional research into the structural factors affecting occupational sex segregation, the “organizational, economic, and individual factors that condition male workers’ response to women’s entry.” More recently, she pushed sociologists to investigate structural constraints while still moving away from individual-level analysis (Reskin 2003).

Sociological research has suggested that any combination of factors may result in the change of an occupation’s sex composition: declining occupational prestige, declining employment security, declining promotion prospects, declining real earnings, deskilling, and male flight from the occupation. However, these studies have resisted specific hypothesis testing for the most part, due to the demand-side (post-employment) limitations of the available data and the difficulty inherent in studying changes in the sex composition of an entire occupation.

Supply-side theories of feminization, which focus on how workers supply themselves to occupations, have suggested that men shy away from occupations that are feminizing on both economic and social grounds. Correspondingly, it is reasonable to expect that men would shy away from the educational programs for occupations that are feminizing.

The present research presents the first robust, empirical tests of supply-side feminization hypotheses. The results provide evidence for economic and organizational mechanisms of feminization for which there was previously only conjecture. This research finds no evidence for the assertion that the presence of women serves as a deterrent to men entering a feminizing occupation. Net of controls, there was no significant relationship between the number of male

applicants to the veterinary programs and either the presence of women as equals in the classroom or in authority positions on the faculty. This finding is consistent both with studies of male well-being in female-dominated settings (Wharton and Baron 1987, Konrad, Winter and Gutek 1992) and with studies of male flight from feminizing occupations (Wright and Jacobs 1994, Coventry 1999). Conversely, the increasing presence of women in the classes also had no significant impact on the number of female applicants. However, the presence of women on the faculty had a significant negative impact on female applicants to the schools. As network and homophily theories would predict a significant positive relationship for women, the reasons for these results are unexplained.

Economic factors seem to play a mixed role in the process of occupational sex turnover. Net of control variables, starting salaries and mean potential earnings appear to have no impact on the number of applicants of either sex to a veterinary program. Rather, it appears that the *relative* wages of veterinarians to the labor force and physicians, specifically, are better predictors of the number of applicants a school receives. This finding holds true for applicants of both sexes. It may be that in states whose physicians earn higher average salaries, men were more likely to be drawn to medical school, or other career paths, over veterinary school. Correspondingly, states whose veterinarians earn higher than average salaries may experience greater prestige and still be appealing to men. Indeed, in 1970, the average earnings for veterinarians were higher than those of physicians in Indiana, Alabama, Washington, and Virginia (Ruggles *et al.* 1997). That same year, the average veterinary earnings were approximately equal to those of physicians in another two states (Iowa and Michigan). What is surprising is that female applicants seem to be influenced by economic factors in the same manner. This finding was unexpected because theories of feminization suggest that women

would be less prompted by economic factors simply because occupations that were previously closed to them, like veterinary medicine, earn so much more than traditionally female fields and the average female worker. To be sure, less variation is explained by the female model than the male model. However, these findings indirectly suggest similarity between the employment decision-making processes of men and women.

This research provides a unique perspective on the process of occupational feminization. The analysis of applicants to the United States veterinary medical colleges avoids the pitfall of studying only professionally-identified veterinarians. By studying changes at the point of contact with an earlier gatekeeper – the veterinary medical colleges – this research is permitted to focus on the events that ultimately lead to the outcome of feminization at the professional level. In addition, the findings from this study suggest the importance of studying the feminization of occupations prior to the entry of workers into the labor market. In this case, when legal and, increasingly, social, barriers to women's entry to American veterinary medical schools were removed, it is possible to obtain a more complete picture of actual *interest* in the profession by studying the sex composition of applicants to the programs.

The results of this study both explicate processes of feminization and raise further questions. The evidence is strongly suggestive of the importance that both economic and organizational factors play in influencing the number of women and men applying to American veterinary medical education programs. However, organizational-level data cannot provide individual-level, psychological explanations (Reskin 2003). At best, these data are indirect indicators of potential cognitive processes. Therefore, although it would be purely speculative, it may be that male interest in the occupation overrides any resistance to the proximity of women as classmates or in positions of authority as faculty. It may also be that the presence of women

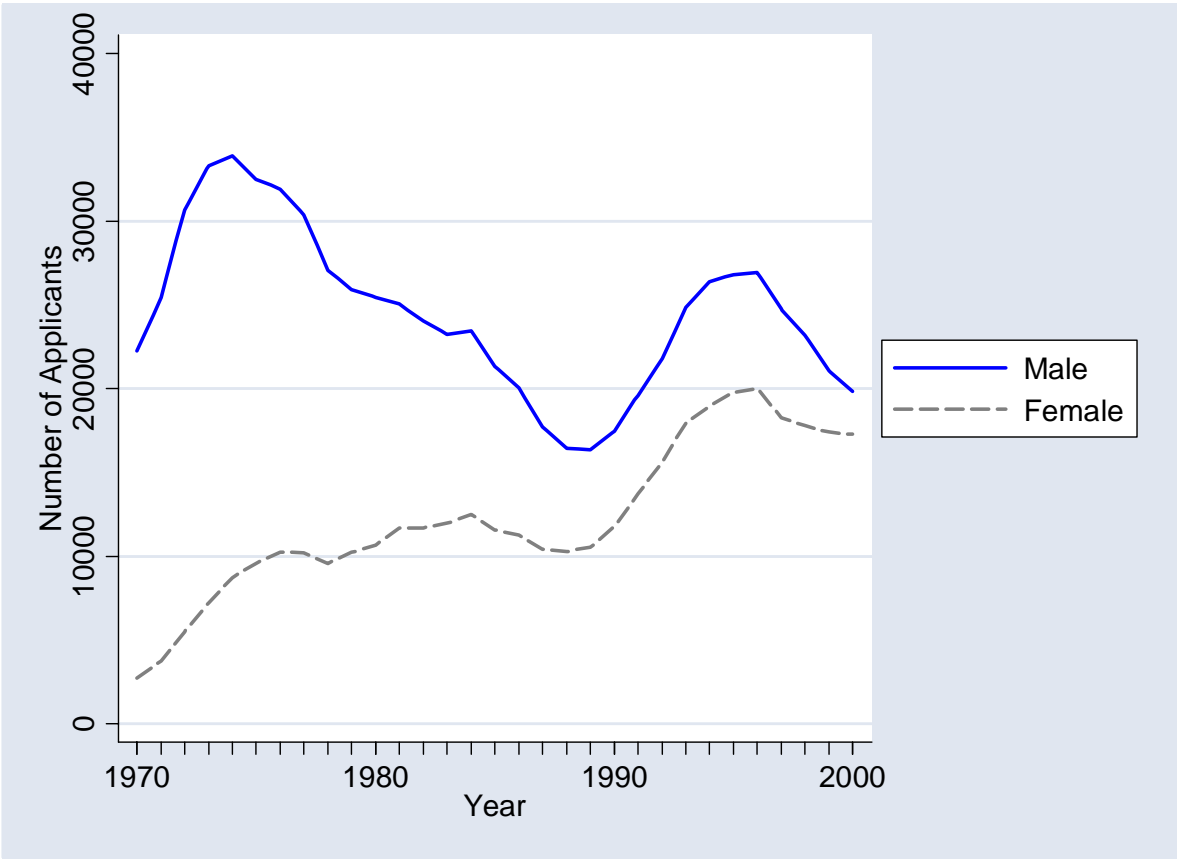
does not necessarily mark an occupation as being undesirable. This research cannot dismiss issues of self-selection, however. Men who are repelled by the attributes of a feminizing occupation may not choose to apply at all. Alternatively, it may be that the financial lure of veterinary medicine or the possibility of owning one's own practice may outweigh male avoidance of working with women.

Overall, the results of this study suggest that men and women respond similarly to organizational and structural constraints in making labor market choices. Yet, the sex composition of the veterinary qualified applicant pool is substantially different from the sex composition of the actual enrollment (Figures 2 and 4, respectively). Therefore, it is the conclusion of this research that while worker preferences and tastes are an important part of occupational sex composition, demand-side constraints offer a more promising explanation. For unexplained reasons, the veterinary medical colleges are allowing more female applicants to enter than male applicants. Thus, the strongest rationalization of the profession's feminization of veterinary medicine should focus on the social closure mechanism of the professional schools.

These results may explain the feminization of veterinary medicine in other countries, such as Canada, Great Britain, the Netherlands, and Australia (Prescott and Hulland 1999, Wells 1984, Heath and Lanyon 1996), and indeed, around the world (World Health Organization 1963, 1968, 1973). All the veterinary schools in these countries have experienced strong growth in the proportion of women applying and enrolling. In addition, the results of this study may also be generalizable to other health professions in the United States. In 2003, the enrollment gap between men and women in first-year medical classes had shrunken to 75 persons and women comprised 49.7 percent of the introductory classes (AAMC 2003). Currently, this is the smallest gender gap among the health professions that are still converging toward gender parity. Given

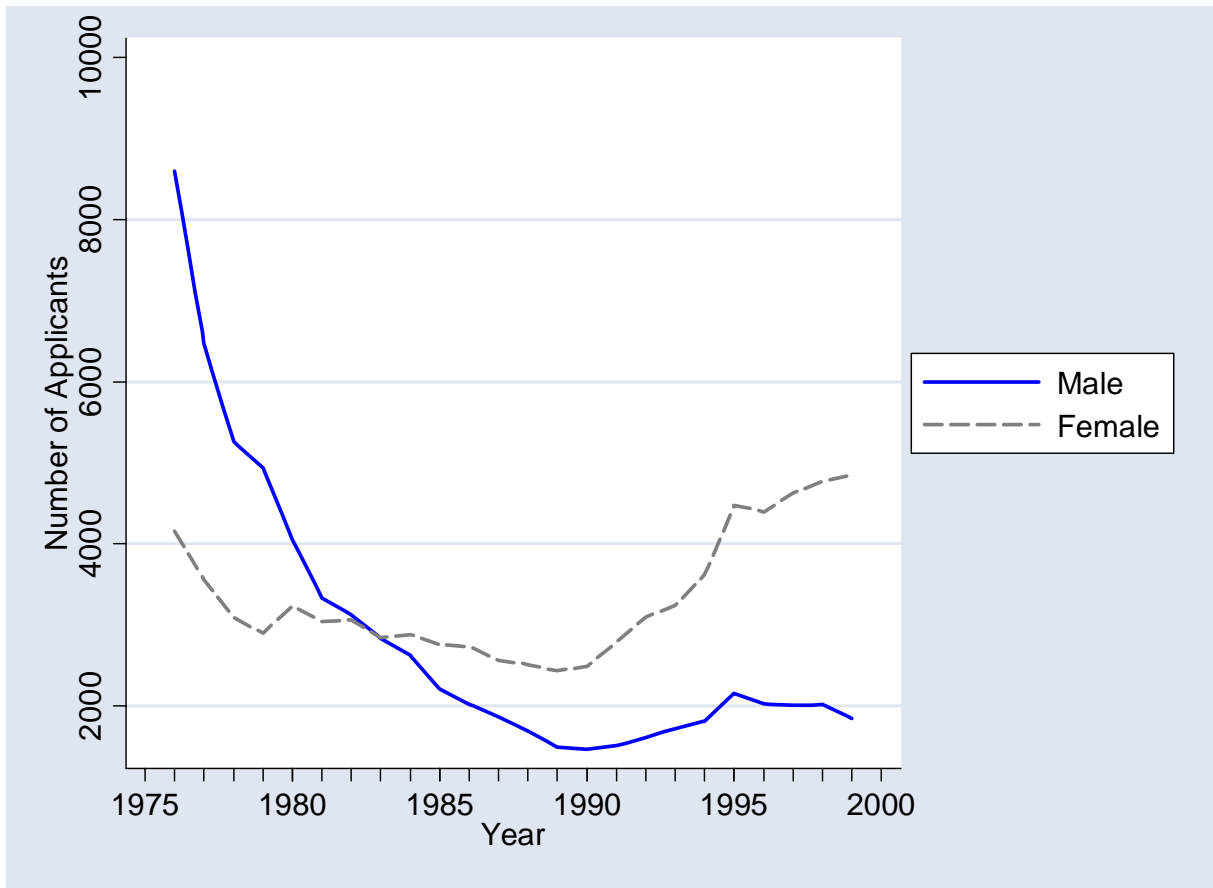
the stability of enrollment trends, it is not unreasonable to anticipate that the number of women enrolling in medical schools will soon be greater than men. Economic factors may be driving the trend toward sex integration in medical school enrollment. Discourse in medical journals has suggested that the salaries of physician residency programs have been stagnant for two decades and that medical salaries may no longer be competitive enough, in comparison to the earnings potential of law or business, to draw more male applicants (Paik 2000, Jones 2000). Therefore, it is expected that the findings from this case study of veterinarians may be strongly suggestive of the current and future trends in medicine.

Figure 1. Applicants to U.S. Medical Colleges By Sex, 1970-1999



Source: American Medical Association Data Book 2000.

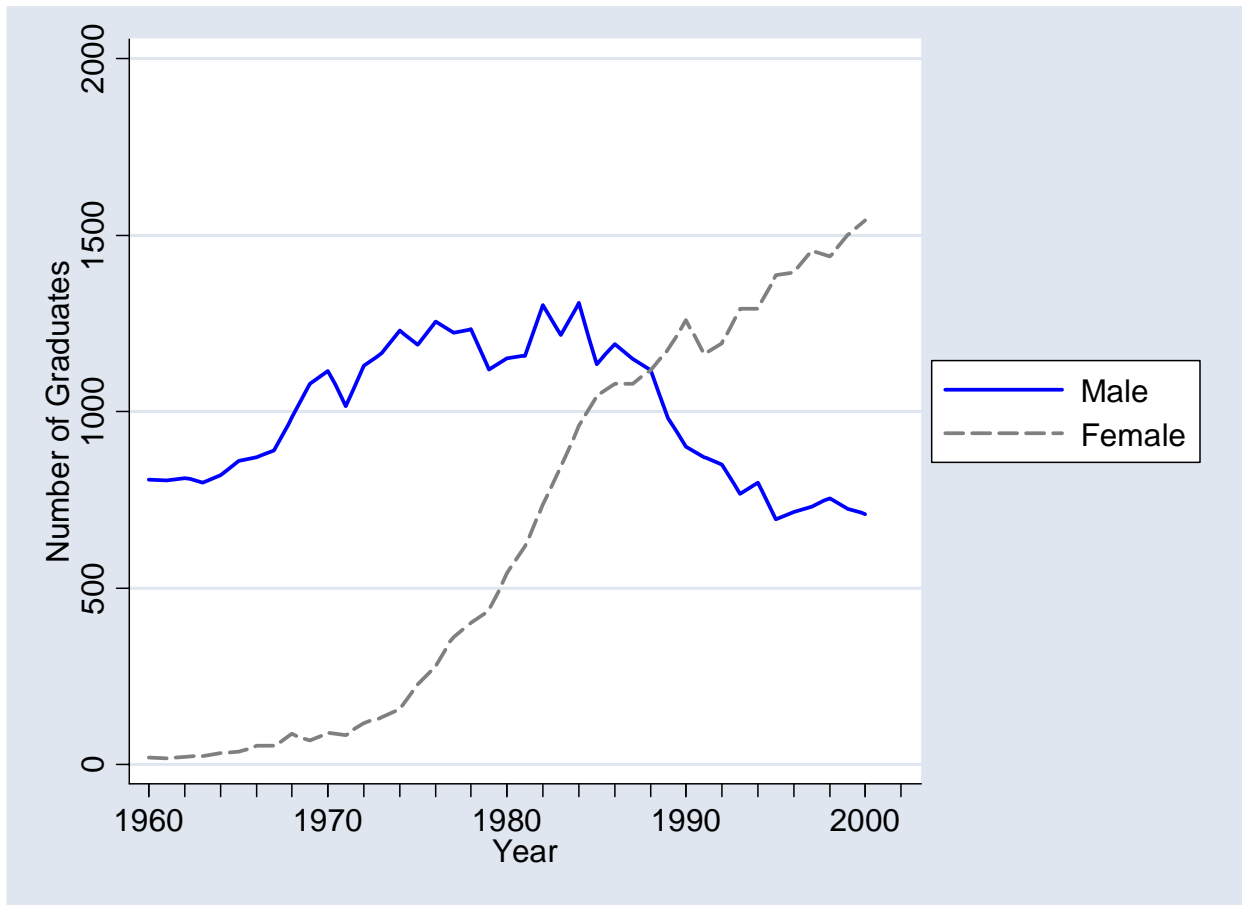
Figure 2. Applicants to U.S. Veterinary Medical Colleges By Sex, 1976-1999



Sources: Association of American Veterinary Medical Colleges. 1976-1979. *Comparative Data Reports*. Washington, D.C.: Association of American Veterinary Medical Colleges.

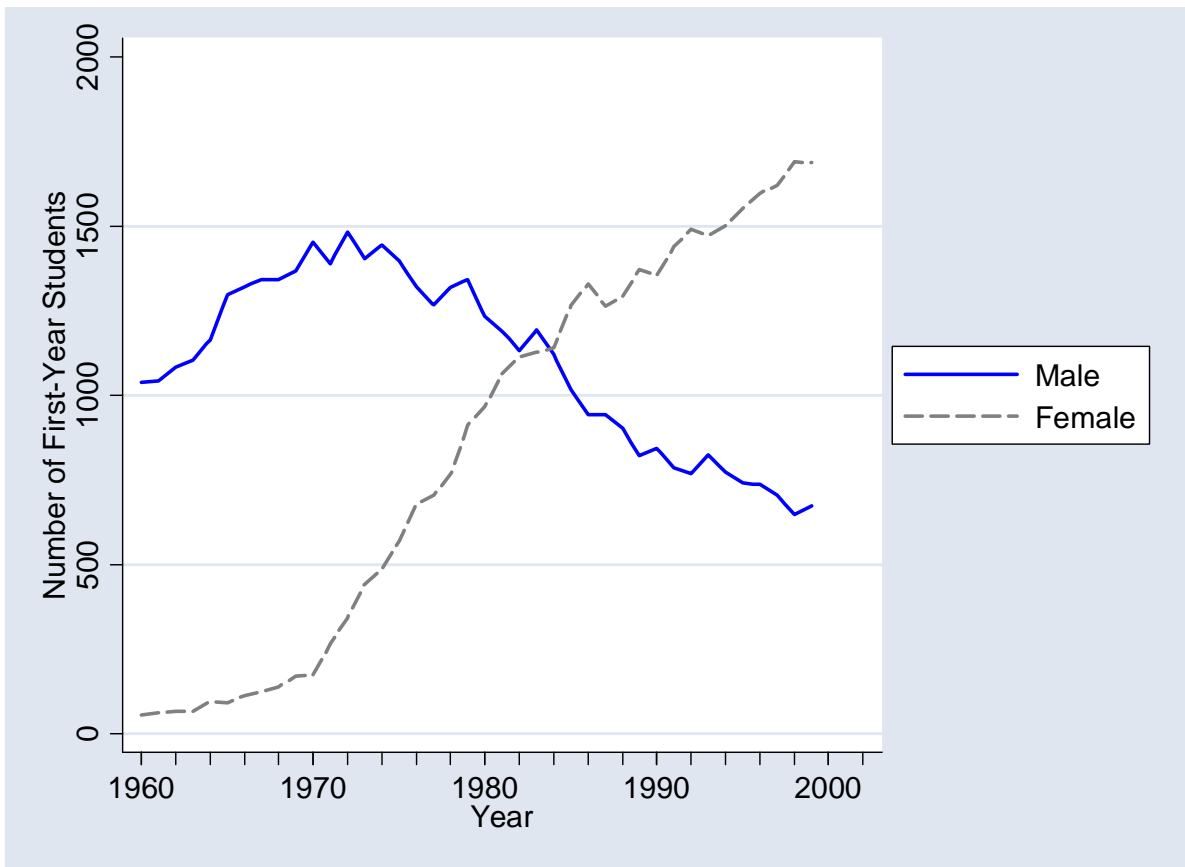
Association of American Veterinary Medical Colleges. 1985-2002. *Veterinary Medical School Admission Requirements in the United States and Canada*. Bethesda, Maryland: Betz Publishing Company.

Figure 3. Graduates of United States Veterinary Medical Colleges By Sex, 1960-2000



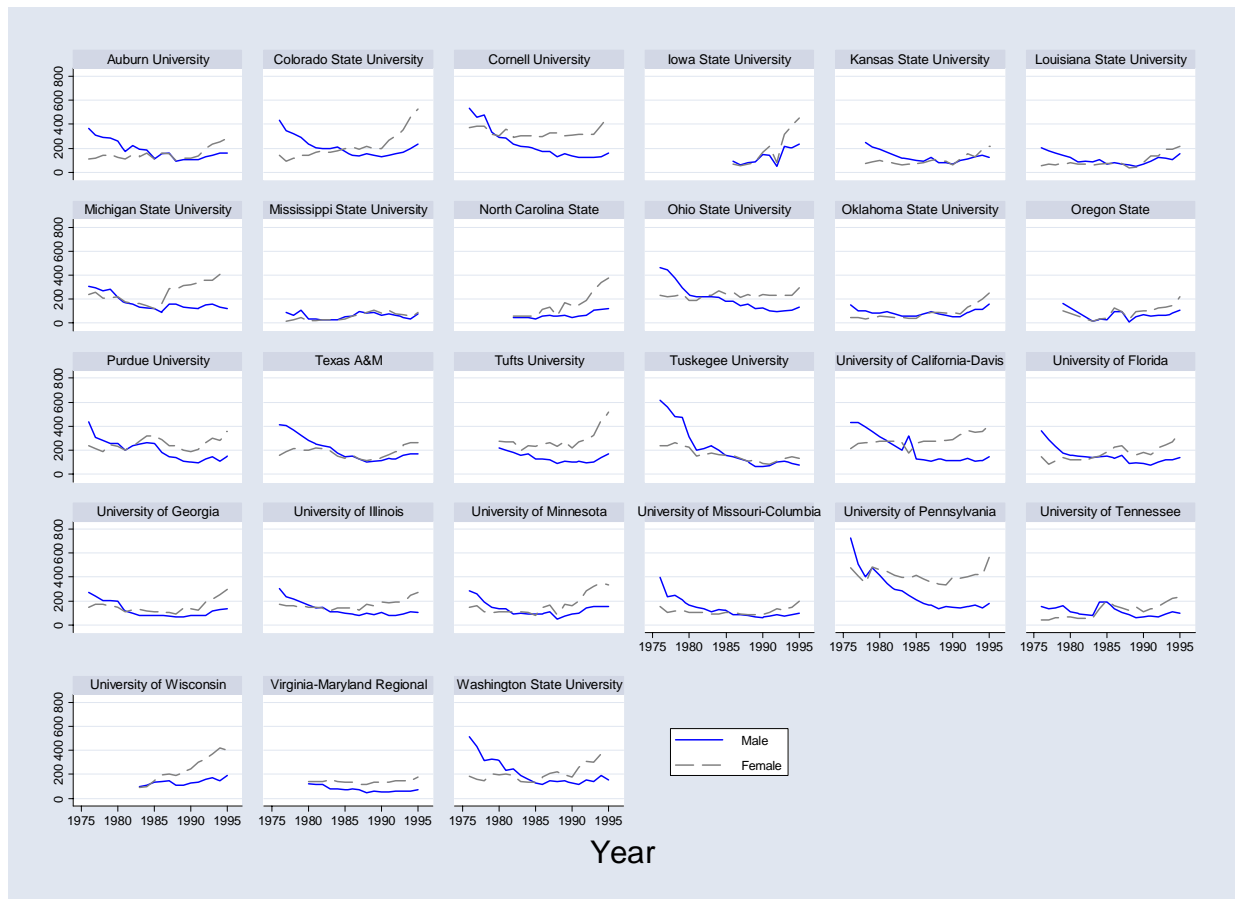
Source: Association of American Veterinary Medical Colleges. Various Years. *Comparative Data Reports*. Washington, D.C.: Association of American Veterinary Medical Colleges.

Figure 4. First-Year Cohort Enrollment in United States Veterinary Medical Colleges By Sex, 1960-2000



Source: Association of American Veterinary Medical Colleges. Various Years. *Comparative Data Reports*. Washington, D.C.: Association of American Veterinary Medical Colleges.

Figure 5. Number of Applicants to United States Veterinary Medical Colleges, By Sex and College, 1976-1995



Sources: Association of American Veterinary Medical Colleges. 1995. *An Analysis of Applications to United States Colleges of Veterinary Medicine: A Report of the Association of American Veterinary Medical Colleges*. Washington, D.C.: Association of American Veterinary Medical Colleges.

Association of American Veterinary Medical Colleges. 1976, 1977, 1978, 1979. *Comparative Data Reports*. Washington, D.C.: Association of American Veterinary Medical Colleges.

Table 1. First-Year Student Enrollment in Six Schools of Selected Health Professions, 1970-1999, By Sex

Year	Number of Schools	First-Year Enrollment	Percent Female
<u>Medical</u>			
1970	103	11,348	11.1
1980	126	17,186	28.9
1990	126	16,876	38.8
1999	125	16,699	45.9
<u>Dentistry</u>			
1970	53	4,565	2.1
1980	60	6,030	19.8
1990	56	4,001	38.0
1999	54	4,314	37.6
<u>Pharmacy</u>			
1970	74	5,694	23.7
1980	72	7,551	48.4
1990	74	8,264 ²	63.0
1999	79	8,123	64.7

Source: 1984. "Minorities and Women in the Health Fields." Health Resources Administration, Division of Health Professions Analysis, Hyattsville, MD.

¹ Data are for 2000 ² Data are for 1991

Table 1. First-Year Student Enrollment in Six Schools of Selected Health Professions, 1970-1999, By Sex (continued)

Year	Number of Schools	First-Year Enrollment	Percent Female
<u>Veterinary Medicine</u>			
1970	18	1,430	10.1
1980	25	2,239	43.4
1990	27	2,197	61.6
1999	27	2,361	71.5
<u>Optometry</u>			
1970	11	884	3.7
1980	16	1,174	25.3
1990	17	1,207	50.7
1999	17	1,369 ³	55.5
<u>Osteopathy</u>			
1970	7	623	2.7
1980	14	1,496	22.0
1990	15	1,950	34.2
1999	17	2,848	42.2

Source: 1984. "Minorities and Women in the Health Fields." Health Resources Administration, Division of Health Professions Analysis, Hyattsville, MD.

³ Data are for 1998

Table 2. United States Bachelor's Degree Recipients, By Sex, 1960-2000

Year	Total Degrees	Percent Female	Percent Change Male	Percent Change Female
1960	365,174	38.5	—	—
1965	250,115	42.5	33.3	57.0
1970	839,731	43.4	58.9	64.9
1975	925,746	45.5	6.2	15.6
1980	935,140	49.8	-6.9	10.6
1985	987,823	50.8	3.4	7.9
1990	1,094,538	53.9	3.7	17.7
1995	1,164,792	53.9	3.7	8.8
2000	1,244,171	53.9	1.8	10.9

Source: U.S. Department of Education, National Center for Education Statistics, Earned Degrees Conferred

Table 3. Number of Veterinarians in the United States and Percentage in Selected Years, By Sex, 1970-1995

Year	Male	Female	Total
1970	24,600 (94.9%)	1,320 (5.1%)	25,900
1980	29,288 (90.1%)	3,212 (9.9%)	32,500
1990	36,204 (74.4%)	12,462 (25.6%)	48,666
1995	37,164 (67.3%)	18,088 (32.7%)	55,252

Sources: Veterinary Demographic Data Reports, American Veterinary Medical Association, 1998; Health Resources Administration, Division of Health Professions: Hyattsville, MD.

Table 4. Summary of Independent and Dependent Variables, 1976-1995

Variables	Description	Coding	Mean
<u>Dependent:</u>			
Male applicants	Number of qualified male applicants adjusted one year	Frequency	159.57 (101.75)
Female applicants	Number of qualified female applicants adjusted one year	Frequency	188.00 (103.09)
<u>Independent:</u>			
Year	Year of study (1975=1)		
Class size	Number of positions open in first-year class	Frequency	85.72 (27.00)
Inter-state education contract	Dichotomous indicator for whether state contracts with another state	1=accepts other state's students	
Southern school	Dichotomous Southern school indicator (school is in Alabama, Florida, Georgia, Kansas, Louisiana, Mississippi, Missouri, North Carolina, Oklahoma, Tennessee, Texas, or Virginia)	1=South	
Tuition	Cost of one year of tuition	1,000 dollars	3.32 (4.49)
Bachelor degrees	Number of bachelor's degrees awarded in a state in a given year	1,000s	7.44 (5.63)
Female faculty	Percentage of female academic veterinary faculty (professors, lecturers)	Percentage	11.27 (9.89)
Female-male enrollment ratio	Ratio of women to men enrolled in first-year class	Ratio	1.01 (.54)
Private practice salary	Average private practice salary offer for graduates of a veterinary program	1,000 dollars	18.98 (3.07)

Table 4. Summary of Independent and Dependent Variables, 1976-1995 (continued)

Variables	Description	Coding	Mean
Assistant professor salary	Average salary of assistant professors at the veterinary medical colleges	1,000 dollars	33.08 (8.30)
Private practice–male labor earnings ratio	Ratio of private practice salary offers to male labor force earnings in a region		.96 (.19)
Private practice–female labor earnings ratio	Ratio of private practice salary offers to female labor force earnings in a region		1.77 (.66)
Veterinarian–male labor earnings ratio	Ratio of mean veterinary earnings in state to male labor force earnings in the region		1.44 (.78)
Veterinarian–female labor earnings ratio	Ratio of mean veterinary earnings in state to female labor force earnings in the region		2.70 (1.57)
Physician-veterinarian earnings ratio	Ratio of mean physician and veterinarian earnings in the state		2.18 (.61)

Note: Numbers in parentheses are standard deviations.

Table 5. Unstandardized Coefficients from the Random Effects Regression of the Number of Male Applicants to United States Veterinary Medical Colleges on Measures of Female Presence, 1976-1995

Independent Variables	Baseline Model	Hypothesis 1: Female Presence	Hypothesis 2: Female Presence
Year	-17.54*** (-16.65)	-16.77*** (-12.48)	-17.23*** (-15.64)
Class size	-0.23 (-0.97)	-0.26 (-1.07)	-0.24 (-0.98)
Inter-state education contract	33.16 (1.61)	33.98 (1.62)	32.55 (1.58)
South	-41.70 (-1.96)	-42.41 (-1.95)	-42.76* (-2.01)
Tuition	-4.96* (-2.01)	-4.72 (-1.88)	-4.98* (-2.02)
Bachelor's degrees in state	1.56** (3.11)	1.66*** (3.18)	1.57** (3.13)
Female-male enrollment ratio	—	-10.05 (-0.90)	—
Percentage of female faculty	—	—	-0.36 (-0.99)
Constant	300.51*** (9.22)	303.32*** (9.14)	303.25*** (9.28)
R ²	.5402	.5397	.5468
rho	.4231	.4322	.4211
N	328	327	328

Note: Values in parentheses are t-values.

* $p < .05$ ** $p < .01$ *** $p < .001$ (two-tailed tests)

Table 6. Unstandardized Coefficients from the Random Effects Regression of the Number of Female Applicants to United States Veterinary Medical Colleges on Measures of Female Presence, 1976-1995

Independent Variables	Baseline Model	Hypothesis 3: Female Presence	Hypothesis 4: Female Presence
Year	0.05 (0.07)	-0.74 (-0.82)	0.62 (0.83)
Class size	0.19 (1.12)	0.20 (1.17)	0.19 (1.11)
Inter-state education contract	10.84 (0.57)	10.26 (0.55)	10.02 (0.52)
South	-47.98* (-2.46)	-47.79* (-2.48)	-50.21* (-2.52)
Tuition	-0.74 (-0.42)	-0.98 (-0.55)	-1.06 (-0.60)
Bachelor's degrees in state	2.37*** (5.22)	2.26*** (4.98)	2.37*** (5.13)
Female-male enrollment ratio	—	10.26 (1.39)	—
Percentage of female faculty	—	—	-0.57* (-2.39)
Constant	87.90*** (3.19)	87.00** (3.18)	92.73*** (3.31)
R ²	.6173	.6235	.6109
rho	.6086	.6007	.6249
N	328	327	328

Note: Values in parentheses are t-values.

* $p < .05$ ** $p < .01$ *** $p < .001$ (two-tailed tests)

Table 7. Unstandardized Coefficients from the Random Effects Regression of the Number of Male Applicants to United States Veterinary Medical Colleges on Measures of Wages, 1976-1995

Independent Variables	Baseline Model	Hypothesis 5: Low Wages	Hypothesis 5: Low Wages
Year	-17.54*** (-16.65)	-16.84*** (-7.34)	-12.21*** (-3.28)
Class size	-0.23 (-0.97)	-0.47 (-1.88)	-0.32 (-1.29)
Inter-state education contract	33.16 (1.61)	34.44 (1.29)	31.88 (1.53)
South	-41.70 (-1.96)	-31.78 (-1.17)	-42.40* (-1.96)
Tuition	-4.96* (-2.01)	-3.78 (-1.17)	-4.97* (-2.00)
Bachelor's degrees in state	1.56** (3.11)	1.70** (2.76)	1.76*** (3.39)
Private practice starting salaries	—	-3.05 (-1.10)	—
Assistant professor salaries	—	—	-2.86 (-1.75)
Constant	300.51*** (9.22)	360.00*** (6.80)	356.19*** (8.18)
R ²	.5402	.5279	.5455
rho	.4231	.6399	.4322
N	328	248	324

Note: Values in parentheses are t-values.

* $p < .05$ ** $p < .01$ *** $p < .001$ (two-tailed tests)

Table 8. Unstandardized Coefficients from the Random Effects Regression of the Number of Female Applicants to United States Veterinary Medical Colleges on Measures of Low Wages, 1976-1995

Independent Variables	Baseline Model	Hypothesis 6: Low Wages	Hypothesis 6: Low Wages
Year	0.05 (0.07)	-0.44 (-0.25)	1.14 (0.52)
Class size	0.19 (1.12)	0.03 (0.13)	0.17 (0.98)
Inter-state education contract	10.84 (0.57)	13.90 (0.53)	10.24 (0.54)
South	-47.98* (-2.46)	-43.02 (-1.63)	-47.63* (-2.44)
Tuition	-0.74 (-0.42)	-0.77 (-0.31)	-0.57 (-0.32)
Bachelor's degrees in state	2.37*** (5.22)	2.18*** (3.70)	2.41*** (5.22)
Private practice starting salaries	—	-0.10 (-0.05)	—
Assistant professor salaries	—	—	-0.62 (-0.56)
Constant	87.90*** (3.19)	109.67* (2.43)	100.18** (2.99)
R ²	.6173	.5708	.6267
rho	.6086	.7579	.6083
N	328	248	324

Note: Values in parentheses are t-values.

* $p < .05$ ** $p < .01$ *** $p < .001$ (two-tailed tests)

Table 9. Unstandardized Coefficients from the Random Effects Regression of the Number of Male Applicants to United States Veterinary Medical Colleges on Measures of Relative Wages, 1976-1995

Independent Variables	Baseline Model	Hypothesis 7: Relative Wages	Hypothesis 9: Relative Wages	Hypothesis 11: Relative Wages
Year	-17.54*** (-16.65)	-14.16*** (-9.40)	-12.46*** (-7.11)	-8.85*** (-5.36)
Class size	-0.23 (-0.97)	-0.40 (-1.65)	0.51 (1.24)	0.58 (1.40)
Inter-state education contract	33.16 (1.61)	30.35 (1.11)	40.07 (1.92)	37.17 (1.73)
South	-41.70 (-1.96)	-44.02 (-1.59)	-36.52 (-1.64)	-29.79 (-1.32)
Tuition	-4.96* (-2.01)	-3.76 (-1.22)	1.66 (0.52)	-0.80 (-0.26)
Bachelor degrees	1.56** (3.11)	1.55* (2.49)	1.08* (2.14)	0.54 (1.01)
Private practice – male labor force earnings ratio	—	129.62*** (4.99)	—	—
Veterinarian – male labor force earnings ratio	—	—	29.26* (2.29)	—
Physician-veterinarian earnings ratio	—	—	—	-78.45*** (-4.95)
Constant	300.51*** (9.22)	162.25** (3.12)	187.47*** (4.13)	385.83*** (7.01)
R ²	.5402	.5245	.6603	.6167
rho	.4231	.6743	.0571	.1284
N	328	248	114	114

Note: Values in parentheses are t-values.

* $p < .05$ ** $p < .01$ *** $p < .001$ (two-tailed tests)

Table 10. Unstandardized Coefficients from the Random Effects Regression of the Number of Female Applicants to United States Veterinary Medical Colleges on Measures of Relative Wages, 1976-1995

Independent Variables	Baseline Model	Hypothesis 8: Relative Wages	Hypothesis 10: Relative Wages	Hypothesis 12: Relative Wages
Year	0.05 (0.07)	1.86 (1.02)	3.00* (2.21)	4.48*** (3.26)
Class size	0.19 (1.12)	0.08 (0.43)	0.58 (1.49)	0.64 (1.65)
Inter-state education contract	10.84 (0.57)	12.98 (0.50)	4.13 (0.19)	2.19 (0.10)
South	-47.98* (-2.46)	-45.38 (-1.73)	-57.32** (-2.58)	-54.73* (-2.44)
Tuition	-0.74 (-0.42)	-0.99 (-0.40)	7.66** (2.83)	6.40* (2.38)
Bachelor degrees	2.37*** (5.22)	2.14*** (3.67)	1.84*** (3.63)	1.52** (2.90)
Private practice - female earnings ratio	—	12.47* (2.35)	—	—
Veterinarian-female labor force earnings ratio	—	—	8.17 (1.89)	—
Physician-veterinarian earnings ratio	—	—	—	-40.81*** (-3.23)
Constant	87.90*** (3.19)	71.13 (1.76)	33.93 (0.80)	140.80** (2.85)
R ²	.6173	.5679	.7510	.7491
rho	.6086	.7593	.2482	.2806
N	328	248	114	114

Note: Values in parentheses are t-values.

* $p < .05$ ** $p < .01$ *** $p < .001$ (two-tailed tests)

Table 11. Correlation Coefficients and Basic Statistics for Variables Used, 1976-1995

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1) Male applicants	1.0000						
2) Year	-0.5598	1.0000					
3) Class size	0.3272	-0.1019	1.0000				
4) Inter-state contract	0.1882	-0.0121	0.1692	1.0000			
5) South	-0.2470	-0.0161	-0.3028	-0.2164	1.0000		
6) Tuition	-0.1647	0.5863	-0.0901	0.1543	-0.2838	1.0000	
7) B.A. degrees	0.3011	0.0335	0.3836	0.0653	-0.3543	0.2431	1.0000

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1) Female applicants	1.0000						
2) Year	0.2368	1.0000					
3) Class size	0.3241	-0.1019	1.0000				
4) Inter-state contract	0.1623	-0.0121	0.1692	1.0000			
5) South	-0.4742	-0.0161	-0.3028	-0.2164	1.0000		
6) Tuition	0.5290	0.5863	-0.0901	0.1543	-0.2838	1.0000	
7) B.A. degrees	0.6204	0.0335	0.3836	0.0653	-0.3543	0.2431	1.0000

BIBLIOGRAPHY

- Albin, Susan Blackard. 1982. "Social Class Background and Significant Other Influence in Developing Aspirations to Become a Veterinarian: Gender Differences Among Veterinary Students." Unpublished Master's thesis. Louisiana State University.
- American Veterinary Medical Association. 2001. *Economic Report on Veterinarians and Veterinary Practices*. Schaumburg, IL: Center for Information Management.
- Association for Women Veterinarians. 1997. *Our History of Women In Veterinary Medicine: Gumption, Grace, Grit, and Good Humor*. Madison, WI: Omnipress.
- Association of American Medical Colleges. 2002. *Medical School Admission Requirements, United States and Canada, 2003-2004*. Washington, D.C.: Association of American Medical Colleges.
- Baron, James N. and William T. Bielby. 1980. "Bringing the Firm Back In: Stratification, Segmentation, and the Organization of Work." *American Sociological Review* 45:737-765.
- Becker, Gary S. 1957. *Economics of Discrimination*. University of Chicago Press.
- Becker, Gary S. 1981. *A Treatise on the Family*. Cambridge, MA: Harvard University Press.
- Becker, Gary S. 1985. "Human Capital, Effort, and the Sexual Division of Labor." *Journal of Labor Economics* 3:33-58.
- Beller, Andrea H. 1984. "Trends in Occupational Segregation by Sex and Race, 1960-1981." pp.11-26 in Reskin, Barbara F., ed. 1984. *Sex Segregation in the Workplace: Trends, Explanations, Remedies*. Washington, D.C.: National Academy Press.
- Berman, Bella U. and Samuel Rosenthal. 1978. "Construction Grants for Educational Facilities, Fiscal Years 1965-77." Bethesda, MD: Health Resources Administration.
- Bielby, William T. and James N. Baron. 1984. "A Woman's Place Is With Other Women: Sex Segregation Within Organizations." in Reskin, Barbara F. *Sex Segregation in the Workplace: Trends, Explanations, and Remedies*. Washington, D.C.: National Academy Press.
- Bielby, William T. and James N. Baron. 1986. "Men and Women at Work: Sex Segregation and Statistical Discrimination." *American Journal of Sociology* 91:759-99.
- Brown, Lauralyn J. 1987. "Women in the Veterinary Profession: Yesterday and Today." Unpublished Honors thesis. Amherst, MA: Hampshire College.
- Burns, Gilbert A. 2004. Private correspondence.

- Catanzarite, Lisa. 2003. "Race-Gender Composition and Occupational Pay Degradation." *Social Problems* 50: 14-37.
- Chiu, Charlotte and Kevin T. Leicht. 1999. "When Does Feminization Increase Equality? The Case of Lawyers." *Law & Society Review* 33:557-593.
- Clark-Keyser, Mary. 2003. Private correspondence.
- Cohen, Lisa E., Joseph P. Broschak, and Heather A. Haveman. 1998. "And Then There Were More? The Effect of Organizational Sex Composition on the Hiring and Promotion of Managers." *American Sociological Review* 63:711-727.
- Cohn, Samuel Ross. 1985. "Clerical Labor Intensity and the Feminization of Clerical Labor in Great Britain, 1857-1937." *Social Forces* 1060-1068.
- Correll, Shelley. 2001. "Gender and the Career Choice Process: The Role of Biased Self-assessments." *American Journal of Sociology* 106:1691-1730.
- Correll, Shelley. 2004. "Constraints Into Preferences: Gender, Status, and Emerging Career Aspirations." *American Sociological Review* 69:93-113.
- Coventry, Barbara Thomas. 1999. "Do Men Leave Feminizing Occupations?" *The Social Science Journal* 36:47-64.
- Drentea, Patricia. 1998. "Consequences of Women's Formal and Informal Job Search Methods for Employment in Female-Dominated Jobs." *Gender & Society* 12:321-338.
- Editorial. 1967. "Veterinarians' Incomes." *Journal of the American Veterinary Medical Association* 150:1536-1537.
- England, Paula. 1982. "The Failure of Human Capital Theory to Explain Occupational Sex Segregation." *The Journal of Human Resources* 17:359-370.
- England, Paula. 1992. *Comparable Worth: Theories and Evidence*. Hawthorne, NY: Aldine de Gruyter.
- England, Paula, George Farkas, Thomas Dou, and Barbara Kilbourne. 1988. "Explaining Occupational Sex Segregation and Wages: Findings from a Model with Fixed Effects." *American Sociological Review* 53:544-558.
- England, Paula, Melissa S. Herbert, Barbara Stanek Kilbourne, Lori L. Reid, and Lori McCreary Megdal. 1994. "The Gendered Valuation of Occupations and Skills: Earnings in 1980 Census Occupations." *Social Forces* 73:65-100.
- England, Paula, Jennifer Thompson, and Carolyn Aman. 2001. "The Sex Gap in Pay and Comparable Worth." in Berg, Ivar and Arne L. Kalleberg, eds. *Sourcebook of Labor*

- Markets: Evolving Structures and Processes*. New York: Kluwer Academic/Plenum Publishers.
- Fernandez, Roberto M. and Nancy Weinberg. 1997. "Sifting and Sorting: Personal Contacts and Hiring in a Retail Bank." *American Sociological Review* 62:883-902.
- Getz, Malcolm. 1997. *Veterinary Medicine in Economic Transition*. Ames, IA: Iowa State University Press.
- Gose, Ben. 1998. "The Feminization of Veterinary Medicine." *The Chronicle of Higher Education* April 24, A55-A56.
- Granovetter, Mark. 1973. "The Strength of Weak Ties." *American Journal of Sociology* 78:1360-80.
- Granovetter, Mark. 1985. *Getting A Job: A Study of Contacts and Careers*. Second Edition. Chicago: The University of Chicago Press.
- Greene, William H. 1990. *Econometric Analysis*. Fourth Edition. New Jersey: Prentice Hall.
- Hall, Elaine J. 1993. "Waitering/Waitressing: Engendering the Work of Table Servers." *Gender & Society* 7:329-346.
- Hanson, Susan and Geraldine Pratt. 1991. "Job Search and the Occupational Segregation of Women." *Annals of the Association of American Geographers* 81:229-253.
- Hara, Yoshio. 1962. "Age and Sex in the Educational Relation." *Kyoiku-shakaigaku Kenkyu/The Journal of Educational Sociology* 17:50-57.
- Heath, T.J. and A. Lanyon. 1996. "A Longitudinal Study of Veterinary Students and Recent Graduates. 4. Gender issues." *Australian Veterinary Journal* 74:305-308.
- Henson, Kevin D. and Jackie Krasas Rogers. 2001. "'Why Marcia, You've Changed!' Male Clerical Temporary Workers Doing of Masculinity in a Feminized Occupation." *Gender & Society* 15:218-238.
- Hooper, Billy E., and Roger E. Brown. nd. "Student Attrition in North American Veterinary Schools." *Journal of Veterinary Medical Education* 36-39.
- Horsley, Lena. 2003. Private correspondence.
- Jacobs, Jerry A. 1989a. "Long-Term Trends in Occupational Segregation By Sex." *American Journal of Sociology* 95:160-173.
- Jacobs, Jerry A. 1989b. *Revolving Doors: Sex Segregation and Women's Careers*. Stanford University Press.

- Jacobs, Jerry A. 2001. "Evolving Patterns of Sex Segregation" in Ivar Berg and Arne Kalleberg, eds., *Sourcebook on Labor Markets: Evolving Structures and Processes*. New York: Plenum.
- Jacobs, Jerry A. and Ronnie J. Steinberg. 1990. "Compensating Differentials and the Male-Female Wage Gap: Evidence from the New York State Comparable Worth Study." *Social Forces* 69:439-468.
- Jencks, Christopher, Lauri Perman, and Lee Rainwater. 1988. "What Is A Good Job? A New Measure of Labor-Market Success." *American Journal of Sociology* 93:1322-57.
- Jones, Jan M. 1985. "Survey of Women Veterinarians in New Zealand, Part I: Patterns of Work." *New Zealand Veterinary Journal*. 33:121-126.
- Jones, Valerie A. 2000. "Why Aren't There More Women Surgeons?" *Journal of the American Medical Association* 283:670.
- Konrad, Alison M., Susan Winter and Barbara A. Gutek. 1992. "Diversity in Work Group Sex Composition: Implications for Majority and Minority Members." *Research in the Sociology of Organizations* 10:115-140.
- KPMG Peat Marwick LLP. 1999. *The Current and Future Market for Veterinarians and Veterinary Medical Services in the United States*. KPMG Peat Marwick LLP Economic Consulting Services.
- Little, Arthur D. 1978. *Veterinary Supply and Demand in the United States: A Report to the American Veterinary Medical Association*. Cambridge, MA: Arthur D. Little, Inc.
- Marini, Margaret Mooney and Mary C. Brinton. 1984. "Sex Typing in Occupational Socialization." Pp. 192-232 in Reskin, Barbara F. (ed.) *Sex Segregation in the Workplace: Trends, Explanations, Remedies*." Washington, D.C.: National Academy Press.
- Marini, Margaret Mooney and Xiaoling Shu. 1998. "Gender-Related Change in the Occupational Aspirations of Youth." *Sociology of Education* 71:43-67.
- McPherson, J. Miller, Pamela A. Popielarz, and Sonja Drobnic. 1992. "Social Networks and Organizational Dynamics." *American Sociological Review* 57:153-170.
- Milkman, Ruth. 1987. "Gender at Work: The Dynamics of Job Segregation by Sex during World War II." Champaign: University of Illinois Press.
- Miller, Gay Y. 1998. "Earnings, Feminization, and Consequences for the Future of the Veterinary Profession." *Journal of the American Veterinary Medical Association* 213:340-344.

- Mincer, Jacob and Solomon Polachek. 1974. "Family Investments in Human Capital: Earnings of Women." *Journal of Political Economy* 82:76-109.
- Muzzin, L.J., G.P. Brown, and R.W. Hornosty. 1994. "Consequences of Feminization of a Profession: The Case of Canadian Pharmacy." *Women & Health* 21:39-56.
- Norden, Martin F. 1995. "Women in the Early Film Industry" in *The Studio System*, ed. J. Staiger. New Brunswick, NJ: Rutgers University Press.
- O'Connell, Lenahan, Michael Betz, and Suzanne Kurth. 1989. "Plans for Balancing Work and Family Life: Do Women Pursuing Nontraditional and Traditional Occupations Differ?" *Sex Roles* 20:35-35.
- O'Farrell, Brigid and Sharon Harlan. 1982. "Craftworkers and Clerks: The Effect of Male Coworker Hostility on Women's Satisfaction with Non-Traditional Jobs." *Social Problems* 29:252-264.
- Paik, Jodi Elgart. 2000. "The Feminization of Medicine." *Journal of the American Medical Association* 283:666.
- Petersen, Trond and Laurie A. Morgan. 1995. "Separate and Unequal: Occupation-Establishment Sex Segregation and the Gender Wage Gap." *American Journal of Sociology* 101:329-365.
- Petersen, Trond, Ishak Saporta, and Marc-David L. Seidel. 2000. "Offering a Job: Meritocracy and Social Networks." *American Journal of Sociology* 106:763-816.
- Phipps, Polly A. 1990. "Industrial and Occupational Change in Pharmacy: Prescription for Feminization." pp. 111-127 in Barbara F. Reskin and Patricia A. Roos (eds.) *Job Queues, Gender Queues: Explaining Women's Inroads into Male Occupations*. Philadelphia: Temple University Press.
- Prescott, J.F. and T.J. Hulland. 1999. "Demographic Analysis of the Veterinary Profession in Canada." *Canadian Veterinary Journal* 40:5.
- Pritchard, William R., ed. 1989. "Future Directions for Veterinary Medicine." Durham, NC: Duke University.
- Redisch, Robert I. 1971. "Letters: Medical Education – Human and Veterinary – At MSU." *Journal of the American Veterinary Medical Association* 158:540.
- Reskin, Barbara F., ed. 1984. *Sex Segregation in the Workplace: Trends, Explanations, Remedies*. Washington, D.C.: National Academy Press.
- Reskin, Barbara F. 1993. "Sex Segregation in the Workplace." *Annual Review of Sociology* 19:241-270.

- Reskin, Barbara F. 2003. "Including Mechanisms in Our Models of Ascriptive Inequality." *American Sociological Review* 68:1-21.
- Reskin, Barbara F., and Heidi I. Hartmann, eds. 1986. *Women's Work, Men's Work: Sex Segregation on the Job*. Washington, D.C.: National Research Council.
- Reskin, Barbara F. and Debra B. McBrier. 2000. "Why Not Ascription? Organizations' Employment of Male and Female Managers." *American Sociological Review* 65:210-233.
- Reskin, Barbara F., Debra B. McBrier, and Julie A. Kmec. 1999. "The Determinants and Consequences of the Sex and Race Composition of Organizations." *Annual Review of Sociology* 25:335-361.
- Reskin, Barbara F. and Patricia A. Roos. 1990. *Job Queues, Gender Queues: Explaining Women's Inroads Into Male Occupations*. Philadelphia, PA: Temple University.
- Rich, Brian L. 1995. "Explaining Feminization in the U.S. Banking Industry, 1940-1980: Human Capital, Dual Labor Markets or Gender Queuing?" *Sociological Perspectives* 38:357-380.
- Robinson, Mary Beth Higman. 1978. *The Woman Veterinarian: Origins, Education, and Career*. Unpublished Ph.D. Dissertation, Ohio State University.
- Rocard, Marc. 1965. "Feminization in the Medical Professions/La Feminisation des Profession Medicales et Sanitaires." *Cahiers de Sociologie et de demographie medicales* 5:75-77.
- Roos, Patricia A. 1997. "Occupational Feminization, Occupational Decline? Sociology's Changing Sex Composition." *American Sociologist* 28:75-88.
- Roos, Patricia A., and Mary L. Gatta. 1999. "The Gender Gap in Earnings: Trends, Explanations, Prospects." Pp. 95-123 in Gary N. Powell (ed.), *Handbook of Gender and Work*. Thousand Oaks, CA: Sage Publications, Inc.
- Roos, Patricia A. and Barbara F. Reskin. 1984. "Institutional Factors Contributing to Sex Segregation in the Workplace." Pp. 235-60 in Barbara F. Reskin (ed.), *Sex Segregation in the Workplace: Trends, Explanations, Remedies*. Washington, D.C.: National Academy Press.
- Rosenfeld, Rachel A., David Cunningham, and Kathryn Schmidt. 1997. "American Sociological Association Elections, 1975 to 1996: Exploring Explanations For 'Feminization.'" *American Sociological Review* 62:746-759.
- Rotolo, Thomas and J. Miller McPherson. 2001. "The System of Occupations: Modeling Occupations in Sociodemographic Space." *Social Forces* 79:1095-1130.
- Smith-Lovin, Lynn and Miller J. McPherson. 1993. "You Are Who You Know: A Network Approach to Gender." pp. 223-251 in England, Paula, ed. *Theory on Gender/Feminism on Theory*. New York: Aldine de Gruyter.

- Smith, David M. 2002. "Pay and Productivity Differences Between Male and Female Veterinarians." *Industrial and Labor Relations Review* 55:493-511.
- Snyder, Tom. 2004. National Center for Education Statistics. personal correspondence.
- Stogdale, Lea. 1985. "Feminization of the Veterinary Profession." *Journal of Veterinary Medical Education* 11:38-40.
- Strober, Myra H. 1984. "Toward a General Theory of Occupational Sex Segregation: The Case of Public School Teaching." pp. 144-156 in Reskin, Barbara F., ed. 1984. *Sex Segregation in the Workplace: Trends, Explanations, Remedies.* Washington, D.C.: National Academy Press.
- Tanner, Julia and Rhonda Cockerill. 1996. "Gender, Social Change, and the Professions: The Case of Pharmacy." *Sociological Forum* 11:643-660.
- Tanner, Julia, Rhonda Cockerill, Jan Barnsley and A. Paul Williams. 1999. "Gender and Income in Pharmacy: Human Capital and Gender Stratification Theories Revisited." *British Journal of Sociology* 50:97-117.
- Tomaskovic-Devey, Donald. 1993. *Gender and Racial Inequality at Work: The Sources and Consequences of Job Segregation* Ithaca: NY: Cornell ILR Press.
- Thurow, Lester C. 1975. *Generating Inequality: Mechanisms of Distribution in the U.S. Economy.* New York: Basic Books.
- Verdon, Daniel R. 1997. "Exclusive Survey: DVMs Wouldn't Change Careers If They Could Do It Again." *DVM Newsmagazine* 28:17-20.
- Weber, Larry J. 1967. "Student Attrition at Colleges of Veterinary Medicine." *Journal of the American Veterinary Medical Association* 150:1012-1016.
- Weeden, Kim A. Forthcoming. "Profiles of Change: Sex Segregation in the United States, 1910-2000." In *Occupational Ghettos: The Worldwide Segregation of Men and Women*, by Maria Charles and David B. Grusky. Stanford, CA: Stanford University Press.
- Wells, B.T. 1984. "Effect on the Veterinary Profession of the Increasing Numbers of Women Graduates." *The Veterinary Record* 114:488-490.
- West, Candace. 1984. "When the Doctor is a 'Lady': Power, Status, and Gender in Physician-Patient Encounters." *Symbolic Interaction* 7:87-106.
- Wharton, Amy S. and James N. Baron. 1987. "So Happy Together? The Impact of Gender Segregation on Men at Work." *American Sociological Review* 52:574-587.

- Williams, Christine L. 1989. *Gender Differences at Work: Women and Men in Nontraditional Occupations*. Berkeley: University of California Press.
- Williams, Christine L. 1992. "The Glass Escalator: Hidden Advantages for Men in the "Female" Professions." *Social Problems* 39:253-67.
- Wolff, Allen. 1998. "Earnings and Feminization of the Veterinary Profession." *Journal of the American Veterinary Medical Association* 213:952-953.
- World Health Organization. 1963. *World Directory of Veterinary Schools*. Geneva: World Health Organization.
- World Health Organization. 1968. *World Directory of Veterinary Schools 1964*. Geneva: World Health Organization.
- World Health Organization. 1973. *World Directory of Veterinary Schools 1971*. Geneva: World Health Organization.
- Woskowski, Jan. 1963. "The Feminization of the Teacher Profession/Feminizacja Zawodu Nauczycielskiego." *Kultura i Społeczeństwo* 7:89-100.
- Wright, Rosemary and Jerry A. Jacobs. 1994. "Male Flight From Computer Work: A New Look at Occupational Resegregation and Ghettoization." *American Sociological Review* 59:511-36.
- Zhao, Yilu. 2002. "Women Soon to Be Majority of Veterinarians: As Pay Loses Ground, Fewer Men Enter Field." *The New York Times* June 9, p. 24.

APPENDIX

A. UNITED STATES VETERINARY MEDICAL COLLEGES

<u>College</u>	<u>First Year of Veterinary Program</u>
Auburn University	1934
University of California-Davis	1948
Colorado State University	1907
Cornell University	1896
University of Florida	1976
University of Georgia	1946
University of Illinois-Urbana-Champaign	1948
Iowa State University	1906
Kansas State University	1909
Louisiana State University	1973
Michigan State University	1911
University of Minnesota	1947
Mississippi State University	1977
University of Missouri-Columbia	1946
North Carolina State University	1981
Ohio State University	1885
Oklahoma State University	1947
Oregon State University	1979
University of Pennsylvania	1883
Purdue University	1959
University of Tennessee	1975

<u>College</u>	<u>First Year of Veterinary Program</u>
Texas A & M University	1916
Tufts University	1979
Tuskegee University	1945
Virginia-Maryland Regional (Virginia Polytechnic Institute and State University)	1980
Washington State University	1899
University of Wisconsin-Madison	1983

B. DATA SOURCES

- Association of American Veterinary Medical Colleges. 1973, 1974, 1975, 1976, 1977, 1978, 1979, 1980, 1981, 1982, 1983, 1984, 1985, 1986, 1987, 1988, 1995. *Comparative Data Report*. Washington, D.C.: Association of American Veterinary Medical Colleges.
- Association of American Veterinary Medical Colleges. 1994, 1995. *An Analysis of Applications to United States Colleges of Veterinary Medicine: A Report of the Association of American Veterinary Medical Colleges*. Washington, D.C.: Association of American Veterinary Medical Colleges.
- Association of American Veterinary Medical Colleges. 1986, 1988, 1991, 1994, 1995, 1996, 2002. *Veterinary Medical School Admission Requirements in the United States and Canada*. Bethesda, Maryland.: Betz Publishing Company.
- Bureau of Economic Analysis. 1997. State Annual Summary Tables for the States and Regions of the Nation, 1958-1997. <http://www.bea.doc.gov> "sasm5897.exe"
- Center for Information Management. 1996. *Veterinary Demographic Annual Reports*. Schaumburg, IL: American Veterinary Medical Association.
- Center for Information Management. 1993, 1994, 1996, 1999. *Economic Report on Veterinarians and Veterinary Practices*. Schaumburg, IL: American Veterinary Medical Association.
- Gehrke, Brad C. 1997. "Enrollment in Veterinary Medical Colleges, 1995-1996 and 1996-1997." *Journal of the American Veterinary Medical Association* 211(10):1240-1.
- Gehrke, Brad C. 1997. "Geographic Distribution of Female and Male Veterinarians in the United States, 1996." *Journal of the American Veterinary Medical Association* 211(8):989-90.
- Glandon, Gerald L. and Robert J. Shapiro. 1980. *Profile of Medical Practice 1980: Decades of the 1970s – The Changing Profile of Medical Practice*. American Medical Association Center for Health Services Research and Development: Monroe, WI.
- King, Miriam, Steven Ruggles, and Matthew Sobek. 2003. *Integrated Public Use Microdata Series, Current Population Survey: Preliminary Version 0.1*. Minneapolis: Minnesota Population Center, University of Minnesota. <http://www.ipums.org/cps>
- Ruggles, Steven and Matthew Sobek et. al. 1997. *Integrated Public Use Microdata Series: Version 2.0*. Minneapolis: Historical Census Projects, University of Minnesota <http://www.ipums.org>
- Wise, J. Karl. 1978. "Average Incomes of Veterinarians in Private Practice, 1977." *Journal of the American Veterinary Medical Association* 173:461-464.

Wise, J. Karl. 1978. "Average Incomes of Veterinarians Not in Private Practice, 1977." *Journal of the American Veterinary Medical Association* 173:465-466.