FEBRUARY 2019

LABOR MARKET ANALYSIS

Animal Science/Farm Management

Prepared by the Central Valley/Mother Lode Center of Excellence

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SUMMARY

This study conducted by the Central Valley/Mother Lode Center of Excellence examines labor market demand, wages, skills and postsecondary supply for occupations related to animal science for Modesto Junior College. Five occupations were provided:

- Farmers, Ranchers, and Other Agricultural Managers (SOC 11-9013)
- Animal Scientists (SOC 19-1011)
- Veterinary Technologists and Technicians (SOC 29-2056)
- First-Line Supervisors of Farming, Fishing, and Forestry Workers (SOC 45-1011)
- Animal Breeders (SOC 45-2021)

KEY FINDINGS:

- **Occupational demand —** More than 7,400 workers were employed in jobs related to animal science in 2017 in the subregion. The largest occupation is farmers, ranchers, and other agricultural managers with 5,440 workers in 2017. Although this occupation is projected to decline by 2% over the next five years, it will have the greatest number of projected annual openings, 403.

- **Wages —** Farmers, ranchers, and other agricultural managers, and animal breeders have entry-level wages that fall below the average living wage for a single adult in the subregion, $11.02/hour. The entry-level wages for farmers, ranchers, and other agricultural managers also fall below the $10.27/hour self-sufficiency wage for the region.

- **Employers —** Top employers in the region include Crystal Cream Butter Company, Banfield Pet Hospital, and Crystal Creamery.

- **Job titles —** The most common occupational title in job postings is farm and ranch manager. The most common job title is veterinary technician.

- **Skills and certifications —** The top baseline skill is communication, the top specialized skill is farm management, and the top software skill is Word Processing. The most in-demand certification is Certified Veterinary Technician.

- **Education —** Four of the five occupations qualify as middle skill. However, the typical education required for animal scientists is a bachelor's degree.

- **Supply —** Analysis of postsecondary completions in the region shows that on average 295 certificates and 250 degrees are conferred in the Central Valley/Mother Lode region each year.

Based on a comparison of occupational demand and supply, there is an undersupply of 398 trained workers in the subregion and 1,695 workers in the region. The Center of Excellence recommends that Modesto Junior College work with the region's agriculture, water and environmental technology deputy sector navigator, the college's advisory board and local industry in the expansion or development of animal science programs to meet workforce demand.

INTRODUCTION

The Central Valley/Mother Lode Center of Excellence was asked by Modesto Junior College to provide labor market information for animal science. Review of the Taxonomy of Programs revealed 12 programs that were appropriate for this analysis:

- Agricultural Power Equipment Technology-011600
- Agriculture Business, Sales and Service-011200
- Agriculture Technology and Sciences, General-010100
- Animal Science-010200
- Artificial Inseminator (Licensed)-010220
- Dairy Science-010230
- Equine Science-010240
- Horticulture-010900
- Natural Resources-011500
- Nursery Technology-010930
- Plant Science-010300
- Veterinary Technician (Licensed)-010210

The geographical focus for this report is the North Central Valley/Northern Mother Lode (NCV/NML) subregion, but regional demand and supply data has been included for broader applicability and use.

Analysis of occupational data related to animal science resulted in the identification of five occupations. The Standard Occupational Classification (SOC) System titles and codes are:

- Farmers, Ranchers, and Other Agricultural Managers (SOC 11-9013)
- Animal Scientists (SOC 19-1011)
- Veterinary Technologists and Technicians (SOC 29-2056)
- First-Line Supervisors of Farming, Fishing, and Forestry Workers (SOC 45-1011)
- Animal Breeders (SOC 45-2021)

The SOC codes, occupational titles, job descriptions, sample job titles, and knowledge and skills from the Bureau of Labor Statistics and O*NET OnLine are shown in Exhibit 1. O*NET data was not available for First-Line Supervisors of Farming, Fishing, and Forestry Workers (SOC 45-1011).

EXHIBIT 1. Animal science SOC titles, job descriptions, sample job titles, and knowledge and skills

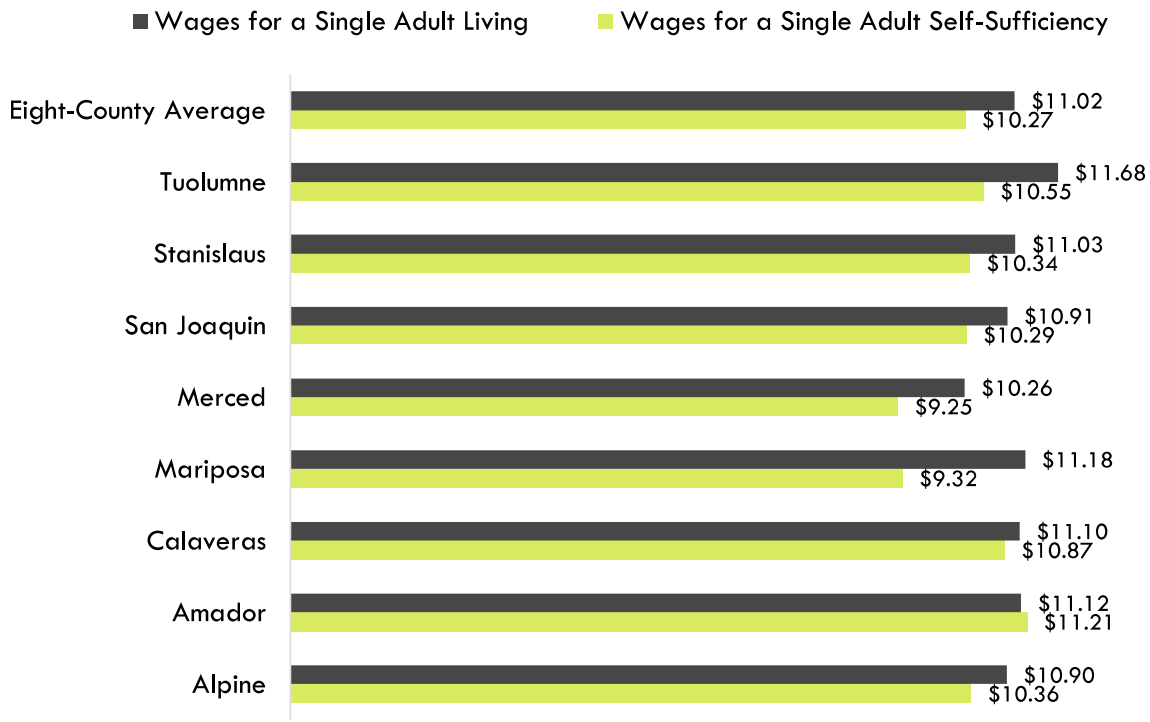
SOC TITLE & CODE	DESCRIPTION	SAMPLE JOB TITLES	KNOWLEDGE & SKILLS
Farmers, Ranchers, and Other Agricultural Managers (SOC 11-9013)	Plan, direct or coordinate the management or operation of farms, ranches, greenhouses, aquacultural operations, nurseries, timber tracts or other agricultural establishments. May hire, train and supervise farm workers or contract for services to carry out the day-to-day activities of the managed operation. May engage in or supervise planting, cultivating,	Farm Manager, Garden Center Manager, Greenhouse Manager, Grower, Harvesting Manager, Horticulturist, Nursery Manager, Perennial House Manager, Production Manager, Propagation Manager	**Knowledge** Administration & Management Production & Processing Personnel & Human Resources Biology Sales & Marketing **Skills** Management of Personnel Resources

SOC TITLE & CODE	DESCRIPTION	SAMPLE JOB TITLES	KNOWLEDGE & SKILLS
	harvesting and financial and marketing activities.		Speaking
			Coordination
			Monitoring
			Active Listening
Animal Scientists (SOC 19-1011)	Conduct research in the genetics, nutrition, reproduction, growth, and development of domestic farm animals.	Animal Nutrition Consultant, Animal Nutritionist, Animal Scientist, Beef Cattle Specialist, Dairy Nutrition Consultant, Nutritionist, Research and Development Director (R&D Director), Research Center Partner, Research Nutritionist, Research Scientist	**Knowledge**
			Biology
			English Language
			Chemistry
			Mathematics
			Food Production
			Skills
			Science
			Critical Thinking
			Reading Comprehension
			Speaking
			Writing
Veterinary Technologists and Technicians (SOC 29-2056)	Perform medical tests in a laboratory environment for use in the treatment and diagnosis of diseases in animals. Prepare vaccines and serums for prevention of diseases. Prepare tissue samples, take blood samples, and execute laboratory tests, such as urinalysis and blood counts. Clean and sterilize instruments and materials and maintain equipment and machines. May assist a veterinarian during surgery.	Certified Veterinary Technician (CVT), Emergency Veterinary Technician, Internal Medicine Veterinary Technician, Licensed Veterinary Technician (LVT), Medical Technologist, Registered Veterinary Technician (RVT), Veterinary Assistant, Veterinary Laboratory Technician (Veterinary Lab Tech), Veterinary Nurse, Veterinary Technician (Vet Tech)	**Knowledge**
			Customer and Personal Service
			Biology
			English Language
			Mathematics
			Medicine and Dentistry
			Skills
			Active Listening
			Critical Thinking
			Reading Comprehension
			Speaking
			Monitoring
Animal Breeders (SOC 45-2021)	Select and breed animals according to their genealogy, characteristics, and offspring. May require knowledge of artificial insemination techniques and equipment use.	Animal Technician, Artificial Inseminater, Artificial Insemination Technician (AI Technician), Breeder, Breeding Manager, Broodmare Foreman, Dog Breeder, Donor Manager, Large Herd Specialist, Stallion Manager	**Knowledge**
			Customer and personal service
			Sales and marketing
			Administration and management
			Biology
			Mathematics
			Skills
			Critical thinking
			Active learning
			Active listening
			Complex problem solving

SOC TITLE & CODE	DESCRIPTION	SAMPLE JOB TITLES	KNOWLEDGE & SKILLS
			Judgement and decision making

The 2014 average self-sufficiency wage for a single adult in the North Central Valley/Northern Mother Lode (NCV/NML) subregion is $10.27/hour, and the current average living wage for a single adult is $11.02/hour. Self-sufficiency and living wage data by county and the overall eight-county average are shown in Exhibit 2. In the wages sections of this report, Pct. 25 hourly denotes entry-level wages, and median represents experienced wages.

EXHIBIT 2. Self-sufficiency and living wages in the NCV/NML subregion



OCCUPATIONAL DEMAND

The subregion employed 7,408 workers in the five animal science occupations in 2017 in the North Central Valley/Northern Mother Lode subregion (Exhibit 3). The largest occupation is Farmers, Ranchers, and Other Agricultural Managers with 5,440 workers in 2017. This occupation is projected to decline by 2% over the next five years, yet has the greatest number of projected annual openings, 403. The next largest occupation is First-Line Supervisors of Farming, Fishing, and Forestry Workers with 1,353 jobs in 2017. This occupation is projected to undergo 3% growth over the next five years and will have 189 annual openings.

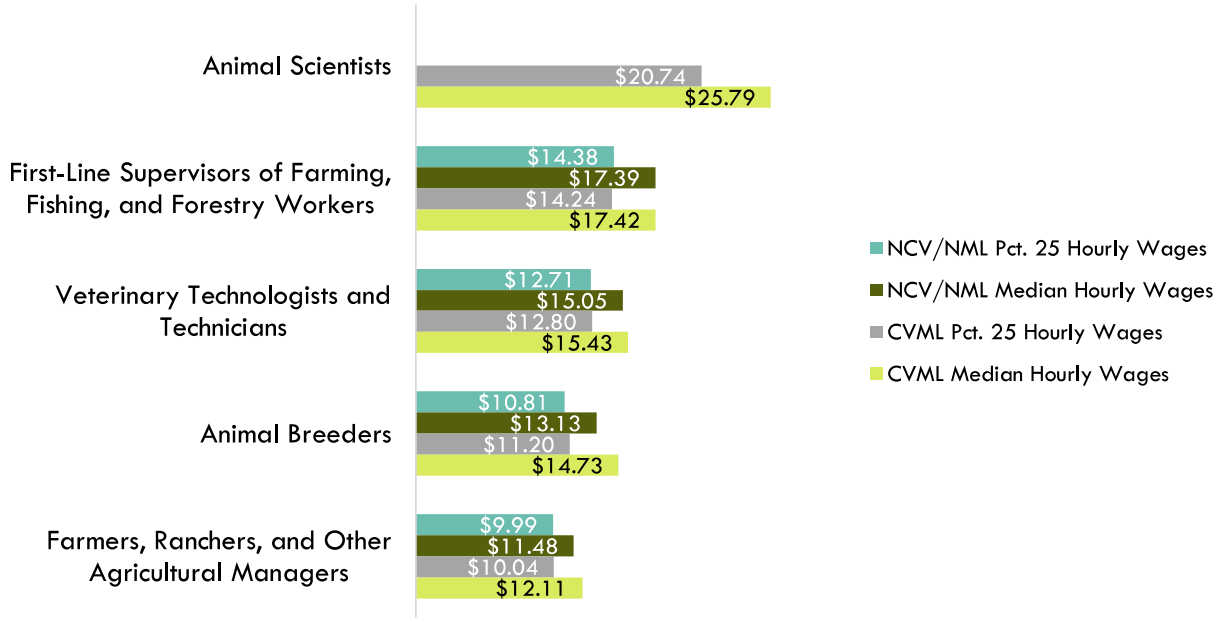
EXHIBIT 3. Animal science employment and occupational projections in the NCV/NML subregion

OCCUPATION	2017 JOBS	2022 JOBS	5-YEAR CHANGE	5-YEAR % CHANGE	ANNUAL OPENINGS
Farmers, Ranchers, and Other Agricultural Managers	5,440	5,343	(97)	(2%)	403
First-Line Supervisors of Farming, Fishing, and Forestry Workers	1,353	1,397	44	3%	189
Veterinary Technologists and Technicians	532	580	48	9%	53
Animal Breeders	83	82	(1)	(1%)	13
Animal Scientists	<10	<10	Insf. Data	Insf. Data	Insf. Data
TOTAL	**7,408**	**7,402**	**(6)**	**2%**	**657**

WAGES

Exhibit 4 compares the entry-level and experienced wages of the five animal science occupations. The entry-level wages for four of the five occupations exceed the average self-sufficiency wage for a single adult in the subregion, $10.27/hour. The exception is farmers, ranchers, and other agricultural managers. This occupation and animal breeders have entry-level wages that fall below the average living wage for a single adult in the subregion, $11.02/hour. The occupation earning the highest median wage is animal scientists, $25.79/hour in the region.

EXHIBIT 4. Animal science entry-level and experienced wage comparison in the subregion and region



JOB POSTINGS

There were 53 job postings for the five occupations in the North Central Valley/Northern Mother Lode subregion from February 2018 through January 2019. The top employers advertising these job postings are listed in Exhibit 5.

EXHIBIT 5. Top employers of animal science occupations by number of job postings

EMPLOYER	JOB POSTINGS
Crystal Cream Butter Company	4
Banfield Pet Hospital	3
Crystal Creamery	3
Kaiser Permanente	2
Pacific States Marine Fisheries Commission	2
All Creatures Veterinary Emergency Clinic	1
All Creatures Veterinary Hospital, Inc	1
Applied Aerospace Structures	1
Ares Corporation	1
Basf Corporation	1

Exhibit 6 shows how job postings for the five targeted animal science occupations in the subregion are distributed across several O*NET OnLine occupations. The majority of job postings, 26 in total, use the occupational title farm and ranch managers, followed by veterinary technologists and technicians, 19 job postings.

EXHIBIT 6. Animal science occupational titles in job postings

OCCUPATIONAL TITLE & CODE	JOB POSTINGS
Farm and Ranch Managers (11-9013.02)	26
Veterinary Technologists and Technicians (29-2056.00)	19
Aquacultural Managers (11-9013.03)	3
Animal Breeders (45-2021.00)	2
Animal Scientists (19-1011.00)	2
Nursery and Greenhouse Managers (11-9013.01)	1

JOB TITLES

Analysis of the 53 advertised job titles for the targeted occupations reveals the top title is veterinary technician, occurring in 15 job postings, followed by agriculture industry manager, eight job postings (Exhibit 7).

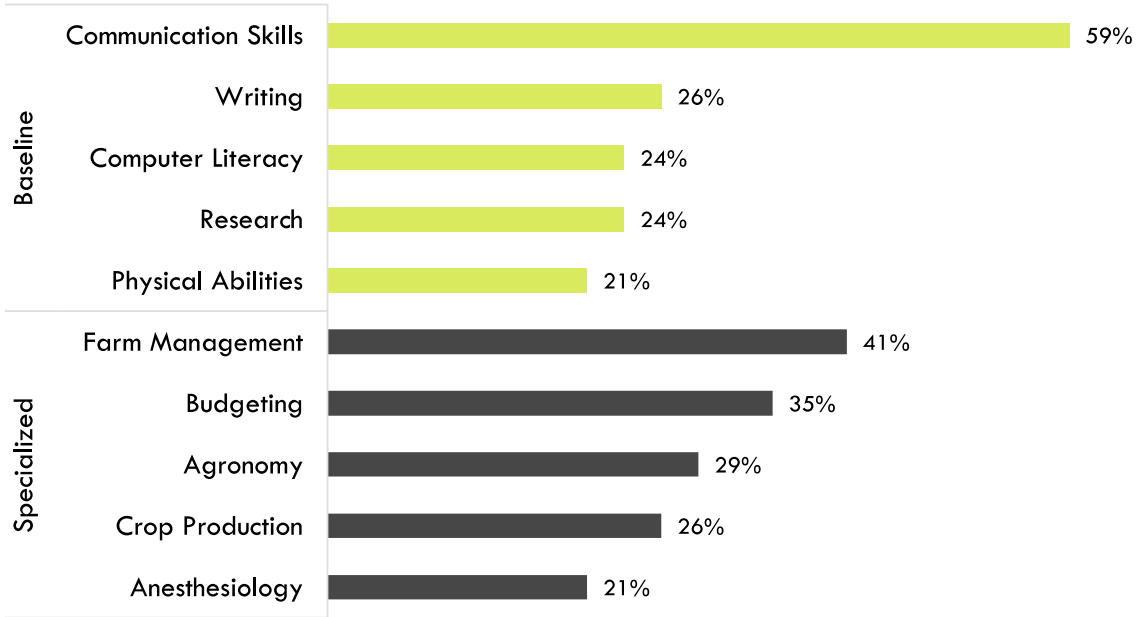
EXHIBIT 7. Top animal science job titles by number of job postings

JOB TITLE	JOB POSTINGS
Veterinary Technician	15
Manager, Agriculture Industry	8
Feeder	7
Animal Health Technician	2
Assistant Manager	2
Farmer, Market	2
Nutrition Partner - Grade	2
Animal Technician	1
Area Sales Manager	1
Assistant Animal Technician	1

SKILLS

Exhibit 8 depicts the top baseline and specialized skills for the five targeted occupations. Only 34 job postings contained skills data. Of these job postings, the three most important baseline skills are communication skills, 59% of job postings, writing, 26%, and computer literacy, 24%. The top three specialized skills are farm management, 41% of job postings, budgeting, 35%, and agronomy, 29%.

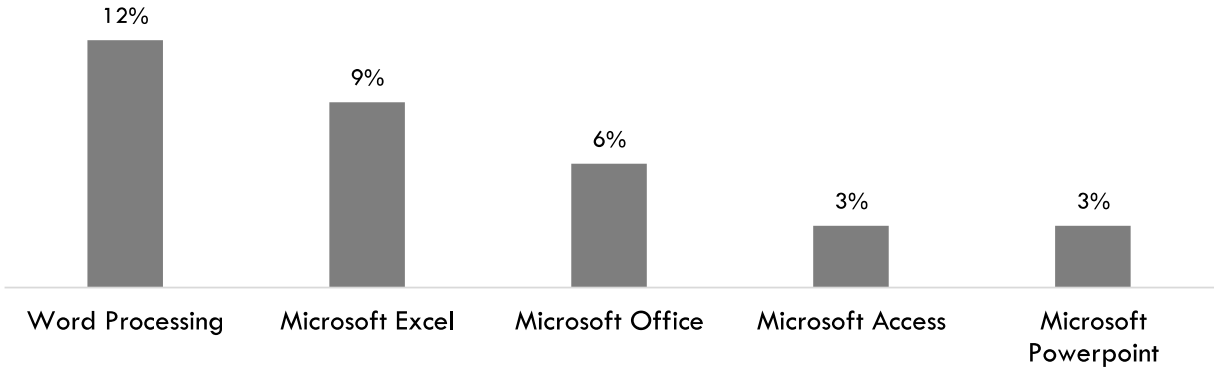
EXHIBIT 8. Animal science in-demand baseline and specialized skills



SOFTWARE SKILLS

Analysis also included the software skills most in demand by employers. Word processing and Microsoft Excel rank first and second (Exhibit 9).

EXHIBIT 9. Animal science in-demand software skills



SKILL CLUSTER PROJECTIONS

Only 26 job postings contained skill projections. An evaluation of the top skill clusters that will have the greatest gains in level of importance shows that the top areas are agriculture, horticulture, and the outdoors: agronomy and farming (65%); finance: budget management (46%); and information technology: Microsoft Office and productivity tools (31%) (Exhibit 10). (Note: 50% of records have been excluded because they do not include a skill cluster. As a result, the chart below may not be representative of the full sample.)

EXHIBIT 10. Skill cluster projections for animal science occupations

CERTIFICATIONS

Of the postings with certification data, nine indicated a need for a veterinary technician certification. The next two top certifications are driver's license and registered dietician (Exhibit 11). (Note: 58% of records have been excluded because they do not include a certification. As a result, the chart below may not be representative of the full sample.)

EXHIBIT 11. Animal science certifications requested in job postings

EDUCATION, WORK EXPERIENCE AND TRAINING

Four of the five occupations are middle skill, requiring either an associate degree or a high school diploma in conjunction with work experience or on-the-job training (Exhibit 12). However, the typical education required for animal scientists is a bachelor's degree.

EXHIBIT 12. Education, work experience, training and Current Population Survey results for animal science occupations[1]

OCCUPATION	TYPICAL ENTRY-LEVEL EDUCATION	WORK EXPERIENCE REQUIRED	TYPICAL ON-THE-JOB TRAINING	CPS
Farmers, Ranchers, and Other Agricultural Managers	High school diploma or equivalent	5 years or more	None	29.1%
Animal Scientists	Bachelor's degree	None	None	0.0%
Veterinary Technologists and Technicians	Associate degree	None	None	56.3%
First-Line Supervisors of Farming, Fishing, and Forestry Workers	High school diploma or equivalent	Less than 5 years	None	23.6%
Animal Breeders	High school diploma or equivalent	None	Short-term	12.7%

[1] "Labor Force Statistics from the Current Population Survey," Bureau of Labor Statistics, https://www.bls.gov/cps/.

SUPPLY

Analysis of California Community Colleges Chancellor's Office Curriculum Inventory (COCI) program data shows there are nine community colleges in the region offering 47 certificate and 56 degree programs contributing to workforce supply for the identified occupations in the 12 TOP codes related to animal science. Analysis of the last three years of TOP code completion data, from 2015 through 2018, shows that, on average, 295 certificates and 250 degrees were conferred in the Central Valley/Mother Lode region each year. The three-year annual average for completions at the subregional level is 106 certificates and 154 degrees (Exhibit 13).

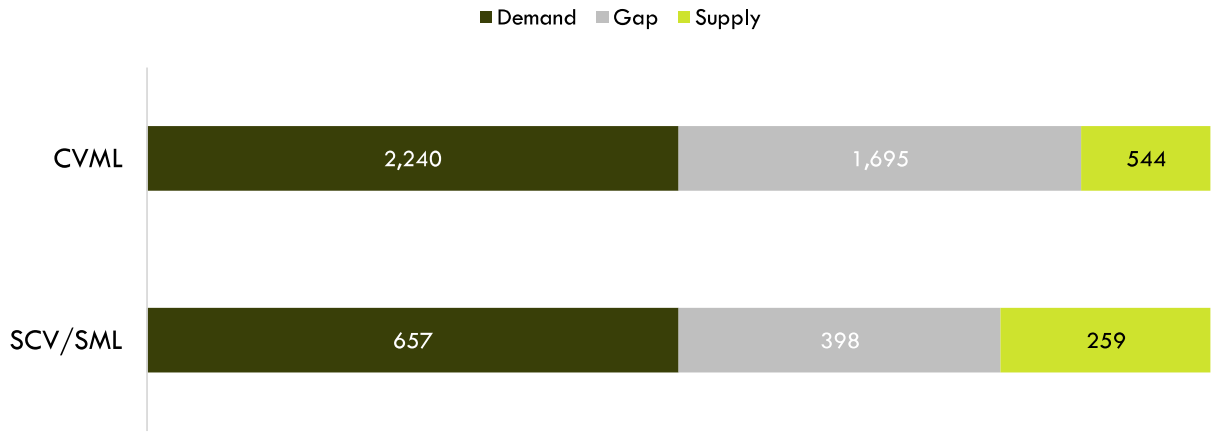
EXHIBIT 13. Postsecondary supply for animal science occupations in the subregion and region, three-year average annual award completions

TOP TITLE-CODE	COLLEGE	CERTIFICATE	DEGREE	SUBTOTAL
Agricultural Power Equipment Technology-011600	Merced	36	4	40
	Modesto Junior	21	5	26
	Reedley College	115	3	118
	San Joaquin Delta	4		4
	Sequoias	0	1	1
Agriculture Business, Sales and Service-011200	Bakersfield	2	22	24
	Merced	1	19	20
	Modesto Junior		32	32
	Reedley College	4	7	10
	San Joaquin Delta		2	2
	Sequoias	8	5	13
Agriculture Technology and Sciences, General-010100	Merced		7	7
	Modesto Junior		9	9
	Porterville		8	8
	Reedley College	2	1	3
	West Hills Coalinga	3	2	5
Animal Science-010200	Bakersfield	3	11	14
	Merced		6	6
	Modesto Junior		23	23
	Reedley College	3	10	13
	San Joaquin Delta	0		0
	Sequoias	2	5	7
Artificial Inseminator (Licensed)-010220	Modesto Junior	2		2
Dairy Science-010230	Modesto Junior		4	4
	Sequoias	3	0	4
Equine Science-010240	Modesto Junior	3		3

TOP TITLE-CODE	COLLEGE	CERTIFICATE	DEGREE	SUBTOTAL
	Reedley College	2		2
	Sequoias	4		4
Horticulture-010900	Bakersfield	1	3	4
	Merced	1	5	6
	Modesto Junior		2	2
	San Joaquin Delta		1	1
	Sequoias	2	1	4
Natural Resources-011500	Columbia	8	11	19
	Reedley College	5	1	7
Nursery Technology-010930	San Joaquin Delta	1		1
Plant Science-010300	Bakersfield	1	7	7
	Merced	1	3	4
	Modesto Junior		16	16
	Reedley College	24	5	29
	San Joaquin Delta	0		0
	Sequoias	2	4	6
Veterinary Technician (Licensed)-010210	Modesto Junior	28	5	33
	Sequoias	1		1
TOTAL		**295**	**250**	**544**

An undersupply of animal science workers appears to exist in the region and subregion. In the subregion, there is a shortage of 398 trained workers. In the region, the shortage is 1,695 trained workers (Exhibit 14).

EXHIBIT 14. Animal science workforce annual demand and supply in the subregion and region



STUDENT OUTCOMES

Exhibit 15 summarizes employment and wage outcomes from the California Community College Chancellor's Cal-PASS Plus LaunchBoard for nine TOP codes related to animal science. Student completions were highest in Agricultural Power Equipment Technology-011600, and the highest number of transfer students occurred in Plant Science-010300. Veterinary Technician-010210 has the highest percentage of students reporting a median change in earnings and the highest percentage of students employed in the second fiscal quarter after exit.

Exhibit 15: Regional metrics for the TOP codes related to animal science

METRIC	AGRICULTURE TECHNOLOGY AND SCIENCES 010100	ANIMAL SCIENCE 010200	VETERINARY TECHNICAN (LICENSED) 010210
Students Who Got a Degree or Certificate	29	82	30
Number of Students Who Transferred	133	171	16
Employed in the Second Fiscal Quarter after Exit	51% (n=185)	73% (n=196)	82% (n=74)
Attained a Living Wage	36% (n=74)	37% (n=128)	35% (n=43)
Median Change in Earnings	115% (n=51)	115% (n=102)	122% (n=51)
Job Closely Related to Field of Study	*	*	*

METRIC	EQUINE SCIENCE 010240	PLANT SCIENCE 010300	HORTICULTURE 010900
Students Who Got a Degree or Certificate	10	36	15
Number of Students Who Transferred	10	398	37
Employed in the Second Fiscal Quarter after Exit	*	72% (n=247)	51% (n=43)
Attained a Living Wage	*	60% (n=119)	*
Median Change in Earnings	*	111% (n=135)	50% (n-12)
Job Closely Related to Field of Study	*	*	

METRIC	NATURAL RESOURCES 011500	AGRICULTURE BUSINESS, SALES AND SERVICES 011200	AGRICULTURAL POWER EQUIPMENT TECHNOLOGY 011600
Students Who Got a Degree or Certificate	14	85	99
Number of Students Who Transferred	73	187	51
Employed in the Second Fiscal Quarter after Exit	78% (n=89)	58% (n=279)	78% (n=196)
Attained a Living Wage	57% (n=63)	44% (n=149)	*
Median Change in Earnings	67% (n=48)	88% (n=103)	59% (n=99)
Job Closely Related to Field of Study	*	*	73% (n-134)

* denotes data not available.

CONCLUSION

Farmers, ranchers, and other agricultural managers, and animal breeders have entry-level wages that fall below the average living wage for a single adult in the subregion, $11.02/hour. Farmers, ranchers, and other agricultural managers also has entry-level wages that fall below the $10.27/hour self-sufficiency wage for the region. There were 53 job postings in the past 12 months for occupations related to animal science in the North Central Valley/Northern Mother Lode subregion.

Analysis of skills and certificate requirements in job postings indicates:

- The top baseline skill is communication, and the top specialized skill is farm management.
- The top software skill is word processing.
- The top certification is Certified Veterinary Technician.

There are eight community colleges in the region offering programs contributing to workforce supply for occupations related to animal science. However, there is an undersupply of trained workers, a shortage of 398 in the subregion and 1,695 in the region.

RECOMMENDATION

Based on these findings, it is recommended that Modesto Junior College work with the region's deputy sector navigator, the college's advisory board and local industry in the expansion or development of programs to meet workforce demand for animal science workers.

APPENDIX A: METHODOLOGY & DATA SOURCES

DATA SOURCES

Labor market and educational supply data compiled in this report derive from a variety of sources. Data were drawn from external sources, including the Economic Modeling Specialists, Inc., the California Community Colleges Chancellor's Office Management Information Systems Data Mart and the National Center for Educational Statistics (NCES) Integrated Postsecondary Education Data System (IPEDS). Below is the summary of the data sources found in this study.

DATA TYPE	SOURCE
Labor Market Information/Population Estimates and Projections/Educational Attainment	Economic Modeling Specialists, Intl. (EMSI). EMSI occupational employment data are based on final EMSI industry data and final EMSI staffing patterns. Wage estimates are based on Occupational Employment Statistics (QCEW and Non-QCEW Employees classes of worker) and the American Community Survey (Self-Employed and Extended Proprietors). Occupational wage estimates also affected by county-level EMSI earnings by industry: economicmodeling.com.
Living Wage	A living wage calculator that estimates the cost of living in a specific community or region: livingwage.mit.edu.
Typical Education Level and On-the-job Training	Bureau of Labor Statistics (BLS) uses a system to assign categories for entry-level education and typical on-the-job training to each occupation for which BLS publishes projections data: www.bls.gov/emp/ep_education_tech.htm.
Labor Force, Employment and Unemployment Estimates	California Employment Development Department, Labor Market Information Division, labormarketinfo.edd.ca.gov
Job Posting and Skills Data	Burning Glass, http://www.burning-glass.com/
Additional Education Requirements/ Employer Preferences	The O*NET Job Zone database includes over 900 occupations as well as information on skills, abilities, knowledge, work activities and interests associated with specific occupations: www.onetonline.org

Key Terms and Concepts

Annual Job Openings: Annual openings are calculated by dividing the number of years in the projection period by total job openings.

Education Attainment Level: The highest education attainment level of workers age 25 years or older.

Employment Estimate: The total number of workers currently employed.

Employment Projections: Projections of employment are calculated by a proprietary Economic Modeling Specialists, Intl. (EMSI) formula that includes historical employment and economic indicators along with national, state and local trends.

Living Wage: The cost of living in a specific community or region for one adult and no children. The cost increases with the addition of children.

Occupation: An occupation is a grouping of job titles that have a similar set of activities or tasks that employees perform.

Percent Change: Rate of growth or decline in the occupation for the projected period; this does not factor in replacement openings.

Replacements: Estimate of job openings resulting from workers retiring or otherwise permanently leaving an occupation. Workers entering an occupation often need training. These replacement needs, added to job openings due to growth, may be used to assess the minimum number of workers who will need to be trained for an occupation.

Total Job Openings (New + Replacements): Sum of projected growth (new jobs) and replacement needs. When an occupation is expected to lose jobs, or retain the current employment level, number of openings will equal replacements.

Typical Education Requirement: represents the typical education level most workers need to enter an occupation.

Typical On-The-Job Training: indicates the typical on-the-job training needed to attain competency in the skills needed in the occupation.

Wages Family Compositions: The living wage calculator estimates the living wage needed to support families. For single adult families, the adult is assumed to be employed full time. For two adult families where both adults are in the labor force, both adults are assumed to be employed full time. For two adult families where one adult is not in the labor force, one of the adults is assumed to be employed full time while the other non-wage-earning adult provides full-time child care for the family's children. Full-time work is assumed to be year-round, 40 hours per week for 52 weeks, per adult. Families with one child are assumed to have a 'young child' (4 years old). Families with two children are assumed to have a 'young child' and a 'child' (9 years old). Families with three children are assumed to have a 'young child,' a 'child,' and a 'teenager' (15 years old).